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**DELPHI VII FORECAST AND ANALYSIS
OF THE NORTH AMERICAN AUTOMOTIVE INDUSTRY**

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Foreword

Introduction

Delphi VII is a detailed analysis of forecasts by three separate panels of automotive industry executives, directors, managers and engineers who are expert in automotive technology, materials and marketing. These individuals were selected because they occupy positions of responsibility within the automotive industry and have strategic insight into important industry trends. In many cases they are in a position to influence these trends. This report, published in three volumes, is the seventh in a series of in-depth studies of long-range automotive trends, which began with Delphi I in 1979 and continued with Delphi II in 1981, Delphi III in 1984, Delphi IV in 1987, Delphi V in 1989 and Delphi VI in 1992.

The Office for the Study of Automotive Transportation (OSAT) collects the data, analyzes, interprets and presents the results. Since the forecasts are those of the panelists, Delphi VII is essentially the industry's own consensus forecast. These forecasts are not "crystal ball" predictions but, rather, well-informed estimates, perspectives and opinions. Such forecasts present an important basis for business decisions and provide valuable strategic planning information for those involved in all areas of the North American automotive industry: manufacturers; service, component and materials suppliers; government; labor; public utilities; and financial institutions. We believe these to be the most authoritative and dependable North American automotive forecasts available.

A key point to keep in mind is that the Delphi forecast presents a vision of the future. It obviously is not a precise statement of the future but rather what the industry thinks the future will likely be.

As an industry-wide survey, the project also allows individual companies to benchmark their vision and strategy against consensus industry opinions.

The Delphi method: general background

The study is based on the Delphi forecasting process. This process requires that experts consider the issues under investigation and make predictions about future developments. Developed by the Rand Corporation for the U.S. Air Force in the late 1960s, Delphi is a systematic, interactive method of forecasting based on independent inputs regarding future events.

The Delphi method is dependent upon the judgment of knowledgeable experts. This is a particular strength because, in addition to quantitative factors, predictions that require policy decision are influenced by personal preferences and expectations. Delphi forecasts reflect these personal factors. The respondents whose opinions are represented in this report are often in a position to influence events and, thus, make their forecasts come true. Even if subsequent events result in a change of direction of a particular forecast, this does not negate the utility of the Delphi. This report's primary objective is to present the direction of technological, materials and marketing developments within the industry, and to analyze potential strategic importance.

Process

The Delphi method utilizes repeated rounds of questioning, including feedback of earlier-round responses, to take advantage of group input while avoiding the biasing effects possible in face-to-face panel deliberations. Some of those biasing effects are discussed in this excerpt from a 1969 Rand memorandum:

The traditional way of pooling individual opinions is by face-to-face decisions. Numerous studies by psychologists in the past two decades have demonstrated some serious difficulties with face-to-face interaction. Among the most serious are: (1) Influence, for example, by the person who talks the most. There is very little correlation between pressure of speech and knowledge. (2) Noise. By noise is not meant auditory level (although in some face-to-face situations this may be serious enough) but semantic noise. Much of the "communication" in a discussion group has to do with individual and group interest, not with problem solving. This kind of communication, although it may appear problem-oriented, is often irrelevant or biasing. (3) Group pressure for conformity. In experiments at Rand and elsewhere, it has turned out that, after face-to-face discussions, more often than not the group response is less accurate than a simple median of individual estimates without discussion (see N. C. Dalkey, *The Delphi Opinion*. Memo RM 5888 PR, p. 14, Rand Corp., 1969).

In the Delphi method, panelists respond anonymously, preventing the identification of a specific opinion with any individual or company. This anonymity also provides the comfort of confidentiality, allowing panelists to freely express their opinions. Among other advantages, this process enables respondents to revise a previous opinion after reviewing new information submitted by other panelists. All participants are encouraged to comment on their own forecasts and on the combined panel results. The information is then furnished to the panel participants in successive iterations. This procedure reduces the effects of personal agendas or biases and assists the panelists in remaining focused on the questions, issues and comments at hand.

Panel characteristics and composition

The very essence of a Delphi survey is the careful selection of expert respondents. The selection of such experts for this Delphi survey is made possible by the long-standing association between The University of Michigan faculty/staff and representatives of the automotive industry. Lists of prospective experts were assembled for Technology, Marketing and Materials panels. Members were selected on the basis of the position they occupy within the automotive industry and their knowledge of the topic being surveyed. They are deeply knowledgeable and broadly experienced in the subject matter.

The names of the panel members and their replies are known only to our office and are maintained in the strictest confidence. Replies are coded to ensure anonymity. The identity of panel members is not revealed. Upon publication of the final Delphi report, all questionnaires and lists of panelists are destroyed.

The characteristics of the 227 member panels are as follows: 10 percent of the Technology Panel were composed of CEOs, presidents, or vice presidents; 22 percent were directors; 23 percent were managers or supervisors; 42 percent were engineers (chief, assistant chief and staff); and 3 percent of the panel were made up of academic specialists and consulting technical-engineering specialists. The Marketing Panel was composed of 29 percent CEOs, presidents, or vice-presidents; 22 percent directors; 39 percent managers; 3 percent engineering specialists; and 7 percent academic and consulting marketing specialists. Among Materials panelists, 14 percent were CEOs, presidents and vice presidents; 12 percent were directors; 51 percent managers and supervisors; 16 percent engineering specialists; and 7 percent academic and consulting materials specialists. Approximately 34 percent of the Delphi VII panelists were employed by vehicle manufacturers; 56 percent by components and parts suppliers; and 10 percent were specialists, consultants and academics.

Presentation of Delphi forecasts and analyses

Data Tables. When a question calls for a response in the form of a number, responses are reported as the median value and the interquartile range (IQR). The median is a measure of central tendency that mathematically summarizes an array of judgmental opinions while discounting extremely high or low estimates; it is simply the middle response. The IQR is the range bounded at the low end by the 25th-percentile value, and at the high end by the 75th-percentile value. For example, in a question calling for a percentage forecast, the median answer might be 40 percent and the IQR 35-45 percent. This means that one-quarter of the respondents answered 35 percent or less, another one-quarter chose 45 percent or more, and the middle half of all responses ranged between 36 percent and 44 percent, with 40 percent as the middle response. That narrow interquartile range would indicate a fairly close consensus among the respondents.

In contrast, the percentage forecast for a different question might show a similar median forecast of 40 percent, but with an interquartile range of 20-70 percent, indicating less consensus and a considerable degree of uncertainty about the issue in question.

Uncovering differences of opinion is one of the major strengths of the Delphi method. Unlike other survey methods, where differences of opinion among experts are often obscured by statistical averages, the Delphi highlights such differences through the presentation of the interquartile range.

Discussion. Narrative discussions are presented to highlight and explain a particular set of data.

Selected Edited Comments. Selected, edited comments from the Delphi panelists are shown following each data table in order to provide some insight into the deliberative process by which panelists arrived at their forecast.

In a Delphi survey, respondents are encouraged to contribute comments to explain their forecast and to perhaps persuade other respondents to change their positions. Many of these edited comments are included. These replies may provide important information which is not evident in the numerical data. An individual panelist may have unique knowledge that planners should carefully consider. However, readers should be careful not to overemphasize a particular comment. It is possible for a well-stated contrary opinion to mislead the reader into ignoring an important majority opinion which is accurately reflected in numerical data.

Manufacturer/Supplier Comparison. Delphi VII panelists include respondents from the North American automotive manufacturers; the major suppliers of components, parts, and materials for the industry; as well as consultants and academics. A concerted effort is made to obtain a relatively equal distribution of manufacturer and supplier panelists. Within the context of this survey, categorizations will refer simply to either Manufacturer (or for brevity in tables, OEMs—Original Equipment Manufacturers) and Suppliers.

For obvious competitive reasons, the automotive manufacturers seek to maintain a degree of secrecy regarding their design, engineering and marketing plans. While the relationship between the manufacturer and supplier is moving toward an increasingly closer degree of cooperation and integration, a considerable

element of proprietary concern remains. Additionally, the very size and complexity of the automotive industry works against optimum information transfer. Therefore, where it is considered relevant to a better understanding of or perspective on the forecast, our analyses include a comparison of the forecast from manufacturer and supplier panelists in an attempt to illustrate where significant agreements or differences exist between the opinions of these two groups.

Comparison of Panels. The three groups of Delphi panelists (Technology, Marketing and Materials) are asked questions that specifically focus on their respective area of expertise. However, a few questions are considered common to two or more panels. For example, the fuel-price question (see MAT-3) is considered so basic that it was submitted to all three panels.

At times, the panels will give differing responses to these questions. This may reflect the makeup of a particular panel and the panelists' subjective perception of the issue in question. Where differences do exist between the panels, serious consideration should be given to whether the difference reflects the composition and proprietary interest of that particular panel or whether there exists a substantial degree of uncertainty regarding the issue in question. We try to highlight both the differences and similarities.

Trend from Previous Delphi Surveys. A single Delphi survey is a snapshot which collects and presents the opinions and attitudes of a group of experts at a particular point in time. Some questions, in various forms, were asked in previous Delphi surveys, and thus provide trend data. The fact that forecasts for a particular question may exhibit considerable variation over the years does not diminish its relevance and importance to strategic planning, because it reflects the consensus of expert opinion at the time. These opinions and forecasts are predicated on the best information available at the time. However, market, economic and political factors do change. Trend data can reveal the stability or volatility of a particular market, material or technology issue. A careful analysis of trend data is an important consideration in strategic business planning decisions.

Strategic Considerations. Based on the replies to a particular question, other relevant Delphi VI forecasts, other research and studies, and OSAT's extensive interaction with the automotive industry, this report makes inferences and interpretations as to the core issues in questions and their potential impact on the industry. By no means are they exhaustive statements of critical issues. Rather, they are points that the reader might consider useful.

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Executive Summary

Shaped by evolving consumer wants and means, manufacturer strategies and actions, and governmental policies and constraints, tomorrow's automotive competitive battleground may play like an intensified version of the last 10 years. This scenario is expected by the panelists of the University of Michigan's Office for the Study of Automotive Transportation's Delphi VII Forecast and Analysis of the North American Automotive Industry through 2003. They identify mature markets, regulation, product affordability, consumer priorities, product reliability and dependability, and integration of wide-ranging resources as core strategic planning issues. Perhaps the greatest uncertainties—each with the potential of moving the industry off established trend lines—are the challenges posed by implications of the North American Free Trade Agreement (NAFTA); the success of broad, national research consortia; the rate of progress in developing countries; and the influence of dealer partnerships. Because the panelists generally see continuing historic trends in broad competitive dimensions, this executive summary highlights the issues that could divert the industry from these trend lines.

The NAFTA debate came to a close as we finished our second round surveys. Our marketing panelists identify an equal number of pros and cons concerning Mexican operations, and risks as well as opportunities inherent to the agreement itself (MKT-32). The most significant opportunity granted by NAFTA, the panelists believe, is access to an improving Mexican economy. On the other hand, U.S. employment loss is considered the most significant risk. These responses highlight the importance of managing any internationalization strategy. A new production base must be supported by effective production processes, material logistics and managerial support. The panelists believe that electrical, interior trim and electronic components are most likely to be transferred to Mexico from U.S. production sites (MKT-33). Locked in by historic domestic content and other trade constraints, many Mexican plants have operated below desirable economies of scale. These competitive economics will change as NAFTA provisions are implemented.

The broad range of research consortia and other joint ventures is likely to improve the Big Three's competitiveness versus foreign competition (MKT-7a). For the Big Three, 50 percent of respondents identify no change in competitiveness, while 50 percent indicate tightening competitiveness among the three manufacturers. This uncertainty reflects the possibility that individual companies may differentially benefit by redirecting resources freed up through collaborative work to competitive proprietary projects. Panelists question the likelihood and amount of capital that may be diverted and the ability of individual companies to turn this capital into new market opportunities. Future research issues might include alternative fuels, safety designs and components, and manufacturing and process cost reductions (MKT-7b). To be successful, such programs must have a clear objective, share risks and rewards equally, have adequate funding in terms of human and financial capital, possess an effective organizational structure and culture, and facilitate communication.

The North American industry must seize consortium R & D strategies and improved Mexican market opportunities. Globalization often refers only to improving markets for companies from the developed countries, but it also increases the number of competitive companies and countries that developed industries may face. The "Big Three" auto-producing nations—Japan, the United States and Germany—will continue to dominate world production. But second tier producers—led by France and Spain—could represent as much as 5 million units of output annually as Canada, South Korea, the United Kingdom and Mexico join this group (MKT-35). Compared to previous Delphi studies, our current marketing panel sees a dramatic change in attitudes concerning the Peoples Republic of China (MKT-8). While the panel does not feel that China will reach vehicle and component world class cost and quality standards by 2003, it has moved from a very negative view (in the 1991 survey) to generally neutral. This is also true for expectations of China's vehicle markets.

The manufacturers' strategy of leveraging external resources has targeted the supply base and, increasingly, government but the dealership network still appears to be an untapped resource. Certainly, there are many programs (customer satisfaction indices and the like) that are targeted at dealers. However, as many communication and other programs were targeted at suppliers without clear strategic intent, manufacturers have not yet integrated dealer resources into overall company strategy. Brand loyalty will be created and influenced more by customer and dealer relations than by the product itself (MKT-9). Customer handling and convenience must be addressed (MKT-18) to enhance dealer-customer relations and service expertise. Manufacturers must work with the dealers in each of these areas to provide resources as well as strategic direction that will support manufacturer and dealer competitive differentiation.

While the broad competitive challenges are well known—mature markets, segmentation changes, regulation, product affordability and the like—continuing opportunities such as NAFTA, research consortia, developing countries and dealership networks offer manufacturers many avenues to establish or lose competitive advantage.

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MKT-1 Strategic planning involves many factors. The following question presents a partial list of macro-political and economic factors affecting the external business environment. Please indicate your trend forecast for each factor (where 1 = sharply increase, 3 = no change, and 5 = sharply decrease) considering the periods 1994-1998 and 1999-2003. Unless otherwise indicated, all factors refer to the United States.

Political and Economic Trends	Mean Rating	
	Short term: 1994-1998	Long term: 1999-2003
Personal taxation rate	1.9	3.2
Manufacturing competitiveness	1.9	2.2
Energy prices	2.0	1.9
Annual producer price index change	2.1	2.1
Annual GNP change	2.3	2.2
Federal investment incentives	2.4	2.6
Corporate cost of capital	2.6	2.5
Business taxation rate	2.8	2.4
Industry R & D expenditures	2.8	2.5
Federal budget deficit	2.8	3.1
Personal savings rate	2.9	2.6
Trade value of U.S. dollar	2.9	2.8
Political stability	3.2	3.0
Trade deficit	3.3	3.5
Unemployment rate	3.3	3.4

No comments

Discussion

A wide range of factors influence corporate strategic planning. In the short run, our panelists believe personal taxation rates, manufacturing competitiveness and annual producer price index changes will experience the greatest increases. Other factors, such as the U.S. trade deficit and unemployment rates, may decline slightly. In the 1999 to 2003 time frame, personal taxation rates are expected to stabilize. However, manufacturing competitiveness, annual producer price index change and manufacturing competitiveness are expected to continue to increase.

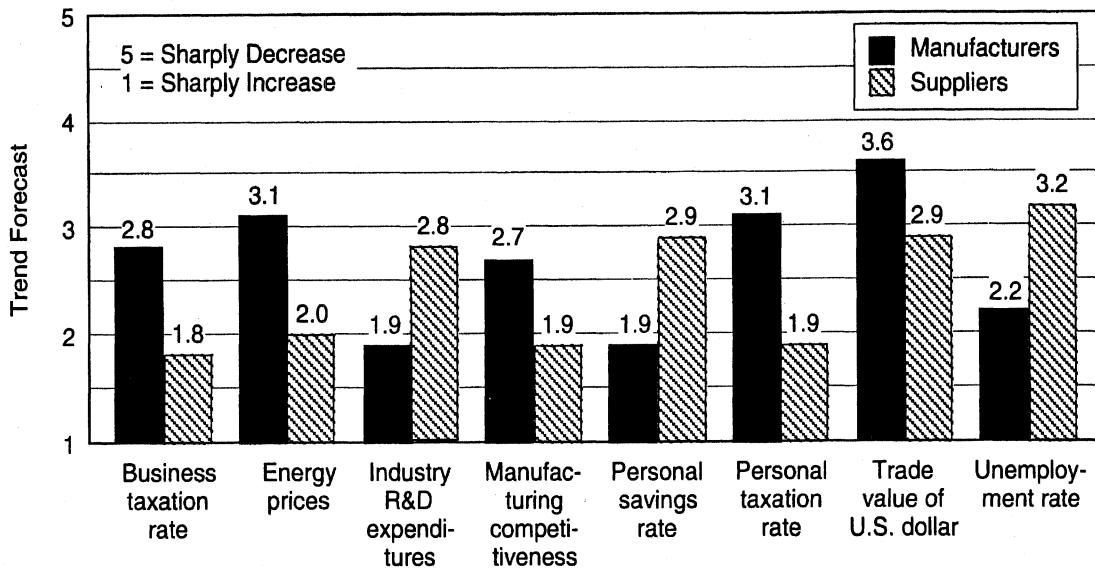
Manufacturer/supplier comparison

Suppliers and manufacturers disagree on several macro-economic trends. We define a disagreement of opinion if the two groups believe the difference in magnitude of change is greater than 0.5 on our 5 point scale. Within the next five years, the manufacturers and suppliers disagree on eight of our fifteen factors. These factors are presented in the figure below.

The suppliers appear less optimistic about the near term. These expectations are driven by rising business taxation rates, energy prices and personal taxation rates. Two factors offset this negativism: a greater expectation of manufacturing competitiveness improvements and a declining unemployment rate. However, suppliers do not see personal savings rates increasing, a source of corporate capital. Nor do they see the trade value of the U.S. dollar decreasing, a mechanism which opens up market opportunities by increasing import prices and reducing export prices.

The manufacturers are more positive about the near future. The group is more neutral regarding business tax rates, energy prices and personal taxation rates. Manufacturers are also very bullish regarding industry R & D expenditures. Expectations of a falling U.S. dollar establishes the United States as a strong export center. Even with these positive signals, however, the manufacturers indicate a very negative position on the unemployment rate. The business taxation rate difference may be driven by varying expectations of health care reform.

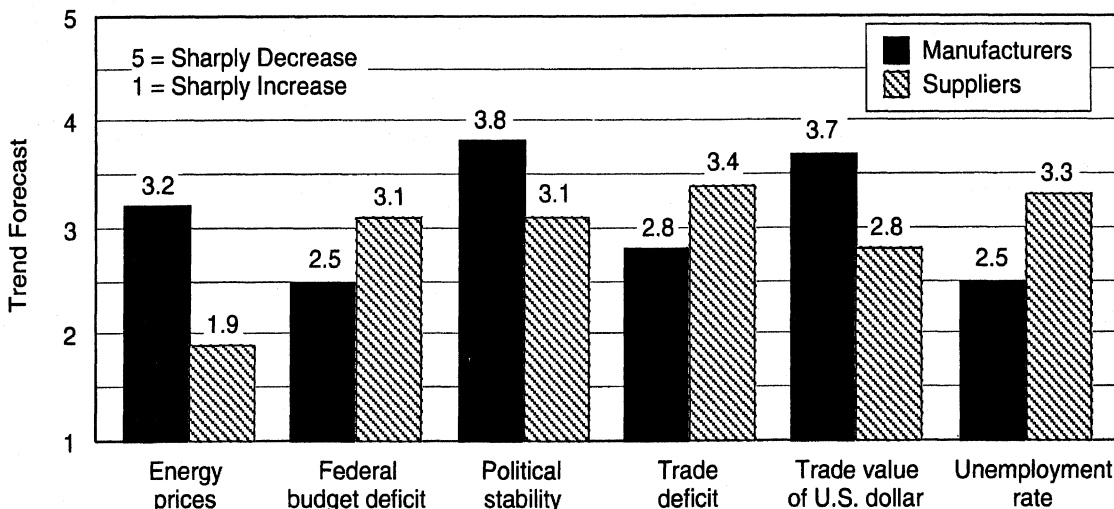
External Business Environment Short-Term Trends



Perhaps the most important differences are those where the two groups view the trends moving in different directions. These trends include energy prices (suppliers, increasing; manufacturers, remain the same), personal taxation rates (suppliers, increasing; manufacturers, remain the same), trade value of the U.S. dollar (suppliers, remain the same; manufacturers, decreasing) and the unemployment rate (suppliers, decreasing; manufacturers, increasing). Each of these factors influence the overall economy, and, specifically for personal taxation and unemployment rates, total and segment automotive sales. It does not appear that differences overall will produce diverging investment strategies between the suppliers and manufacturers. While the suppliers are pessimistic on taxation rates, they are optimistic about unemployment rates. The manufacturers are pessimistic about the trade deficit, but they are optimistic about the position of the U.S. dollar. All of these differences may end up counteracting each other.

The suppliers and manufacturers disagree on fewer strategic planning factors in the decade's second half. The graph below presents the specific differences. Short-term disagreements merge into longer-term agreement regarding business taxes (no change), industrial R&D expenditures (increasing somewhat), manufacturing competitiveness (increasing somewhat), personal savings rate (increasing slightly) and personal taxation rates (increasing slightly).

External Business Environment Long-Term Trends



Suppliers and manufacturers continue to have differing opinions on energy prices, the trade deficit, trade value of the U.S. dollar and the unemployment rate. Except for the unemployment rate, the magnitude actually increases between the two groups. The federal budget deficit and political stability become two trends that the groups disagree over in the 1999 to 2003 time frame. Perhaps these two are related as political leadership is challenged on budget and trade deficits, energy prices and unemployment rates.

Trend from previous Delphi surveys

The format of this question has changed to indicate short-term and long-term forecasts. Comparing the Delphi VII 1994 to 1998 outlook to the 1989 Delphi V (1988 to 2000) and 1992 Delphi VI (1992 to 2000), we find that overall our panelists have become a bit more optimistic. Expectations of the U.S. trade deficit trend have moved from decreasing, to remaining the same, to decreasing in the 1989, 1992 and 1994 surveys, respectively. Comparing the three surveys, expectations of unemployment rates run from remaining the same, to increasing, to decreasing.

Personal savings rates follow the same expectation pattern: from remaining the same to a slight increase. These positive indicators are balanced against changes of decreased U.S. political stability and increased personal taxation rates. Based on traditional measures of the trade deficit, unemployment rates and personal saving rates, our panelists see the fundamentals of a U.S. economic turnaround. These fundamentals were not present when the Delphi VI was released in 1992 and seem to have recovered to the 1989 levels.

Strategic considerations

Corporate investment strategy continues to move along a winding road of mixed economic and social indicators. Success depends on the ability of an organization—industry, union, government and academia—to identify and respond to these trends in a timely, progressive and efficient manner. Timeliness is important because every organization competes at an individual level as a basis for its success—whether that be for market share, profit, membership, tax revenue or research grants. In a changing world order and with greater challenges of succeeding in any of these measures, organizations must position themselves to take advantages of their strengths and minimize their weaknesses. Our panelists see increasing manufacturing competitiveness over the next 10 years. While readers may pause and congratulate themselves on a job well done within their own organization, they should remember that the competition will also increase its competitiveness. Similar organizations have similar goals: increase market share, increase profits, etc. In mature markets, one must ask, "Who will be the casualties?"

Responding progressively relates to the fact that, while organizational and strategic change is inevitable, it cannot be allowed to disrupt an organization's flow of production and the level of morale. Rising energy costs, changes in the annual producer price index, corporate cost of capital and business taxation rates may lead companies toward strategies of unilateral head count reductions to reduce costs, divesting the most marketable (i.e., profitable) divisions to increase cash flow, or business decisions based on short-term tax gains. The long-term strength of a firm must not be compromised by corporate responses to specific, individual political and economic trends.

Efficiency must be addressed as any strategy is carried out. The fact that our panelists believe trade deficits will be reduced over the next 10 years indicates an improved level of international competitiveness. This trade deficit reduction comes with an expectation of a constant trade value of the U.S. dollar. Compared to 1993, a greater level of cost competitiveness is required at the company level since industries will not have as great a currency exchange rate advantage.

MKT-2 Many factors influence the level of new vehicle demand. The following question presents a partial list of economic, social and consumption factors affecting new vehicle sales volumes. Please indicate your trend forecast for each factor (where 1 = sharply increase, 3 = no change, and 5 = sharply decrease) considering the periods 1994-1998 and 1999-2003.

Trends Affecting Vehicle Demand	Mean Rating	
	Short term: 1994-1998	Long term: 1999-2003
Real transaction price of new light trucks	2.2	2.3
Age of operating fleet	2.3	2.4
Used light truck prices	2.3	2.4
Real transaction price of new autos	2.3	2.3
Used car prices	2.4	2.4
Vehicle insurance premiums	2.4	2.3
Consumer attitudes on economy	2.5	2.6
Personal loan interest rates	2.7	2.6
Vehicle travel per person	2.7	2.8
Real personal consumption expenditures on parts and service	2.7	2.7
New vehicle offerings	2.9	2.9
Use of mass transportation	3.0	2.7
Dealer gross margin per vehicle	3.1	3.1
Real disposable personal income	3.2	2.8
Manufacturer brand loyalty	3.3	3.2

No comments

Discussion

The general trends influencing vehicle demand, such as transaction prices, age of the operating fleet and insurance premiums, are expected to continue to increase over the next 10 years. From the panel's perspective, there is no major difference between the short- and long-term trend of any individual factor.

Manufacturer/supplier comparison

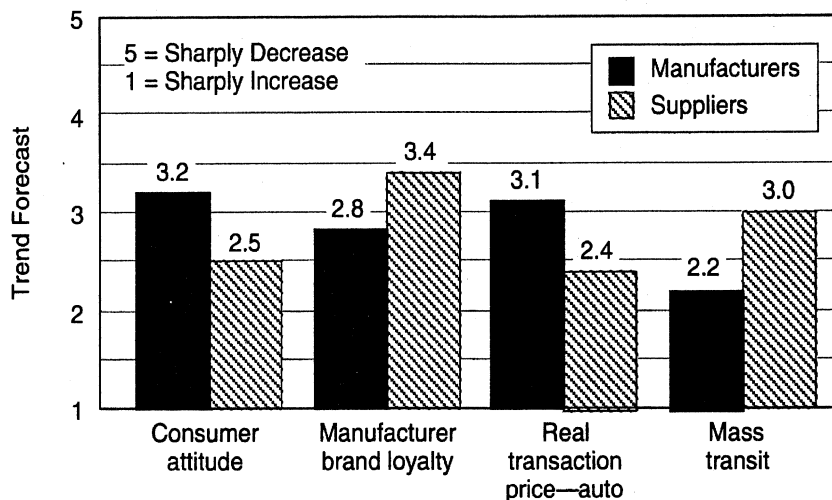
As in question one, we define a disagreement of opinion if the two groups believe the magnitude of change is greater than 0.5 on our 5 point scale. The graph below presents the short-term issues on which the two groups differ, and the table presents the long-term issues. The suppliers are much more optimistic in the short- and long-run about a turnaround in consumer attitudes on the economy. This matches with the suppliers expectations of increasing rates of GNP growth and manufacturing competitiveness and decreasing rates of unemployment and trade deficits. The manufacturers' expectation of continued weak consumer attitudes parallels their expectation of decreasing U.S. political stability and increasing unemployment rates.

Other interesting differences appear in the data. The manufacturers are more optimistic that loyalty to themselves will slightly increase over the next five years, while suppliers see a more difficult marketing issue. Manufacturers believe trends such as value pricing will hold the line on real transaction prices. Suppliers see increasing transaction prices, compounded by equal or slightly declining dealer gross margins. This may indicate a bit of supplier skepticism towards the effectiveness of manufacturer cost reduction and restructuring efforts, and the belief that additional costs—whether required by regulation or imposed by corporate systems—will need to be passed along to consumers.

The manufacturers believe that transaction prices and dealer margins will be maintained. This indicates successful cost reduction efforts both by the vehicle manufacturer and at the dealership. Dealer margins have been weak over the last five years, so reversing this trend will take a concerted effort by each party.

The second five-year period denotes an interesting trend for transportation planners. If the manufacturers' vision proves out, we will have an increase in mass transportation usage and vehicle travel per person. These seemingly contradictory statements likely come from the expectations of changing commute patterns (suburb to suburb), housing patterns (expansion into less developed areas) and expectations of increased spending for mass transportation (high speed rail, bus, and other).

New Vehicle Demand Factors Short-Term Trends



Long-Term Trends Affecting Vehicle Demand: Manufacturer versus Supplier Mean Forecast Comparison		
	Manufacturers	Suppliers
Consumer attitude	3.2	2.5
Vehicle travel per person	1.5	2.8

Trend from previous Delphi surveys

Comparing the 1989 Delphi V's 1988 to 2000, the 1992 Delphi VI's 1992 to 2000, and the current Delphi VII's 1994 to 1998 trends, we find five categories where the panelists have altered their forecasts. Personal loan interest rates, which were expected to remain constant in the 1989 (50 percent of respondents indicated no change, 42 percent believed rates would increase) and 1992 surveys (2.0 on a 1 to 3 scale), are now expected to begin rising. Bank loan rates are comparatively low today and interest rates have periodically been subsidized by the vehicle manufacturers' captive credit arms. The current expectation of rising GNP growth rates, federal investment incentives, corporate cost of capital, industry R & D expenditures and the federal budget deficit with decreasing political stability and unemployment rates all are consistent with these forecasts.

Vehicle travel per person, most likely with the expectations of a recovering economy, is expected to increase compared to previous forecasts. This is a slight contradiction to the current expectation that real disposable personal income will decrease slightly. Real disposable personal income is another trend which has reversed. The current pessimistic attitude is contrasted by a neutral opinion in 1992 and a slightly optimistic 1989 reading (with 38 percent of the respondents predicting increasing incomes and 37 percent indicating incomes would remain the same).

The belief that consumption expenditures on parts and service will increase is an important opportunity for dealers, since the panelists also forecast declining dealer gross margin per vehicle. These two current trends are consistent with previously neutral outlooks. The 1992 Delphi VI panelists rated the parts and service expenditure trend a neutral 2.0 on a 1 to 3 scale. The current, emerging trend is 2.7, a slight swing towards the increasing side of our scale. At the time 1989 Delphi V panelists were surveyed, 35 percent believed parts and service expenditures would increase through the year 2000, while 53 percent believed these expenditures would remain the same. The dealer gross margin trend has fluctuated from generally neutral in the 1989 Delphi V (51 percent expected no change, while 35 percent saw a decreasing trend) to decreasing in the 1992 Delphi VI (2.5 on a 3.0 point scale with 3.0 being decreasing) to slightly decreasing in the current Delphi VII. Certainly, even with moderate growth of overall sales, a reduction in the number of franchise outlets will tend to increase dealer gross margin per vehicle (more vehicle sales are spread over a decreasing fixed cost base). While this assists those who survive, some dealerships must close to make this occur.

Strategic considerations

If automotive marketing was similar to a political campaign, the slogan would read, "It's customer value." The difficulty is understanding what the customer wants and delivering exactly that in the most timely, progressive and efficient manner. Manufacturers and suppliers must succeed under trying short- and long-term conditions. The rising prices of cars and light trucks, insurance premiums, and parts and combined with expected rising interest rates and declining real disposable personal income are causing tremendous consumer stress. Perhaps it is a combination of this stress, the changes in population growth and evolving commuting patterns that influences our panelists for the first time to indicate that the use of mass transportation may actually increase.

From the vehicle manufacturers' perspective, the trend towards increased mass transportation usage is not bad. In fact, vehicle manufacturers might actually want to promote the development of a safe, dependable and accommodating mass transit system, especially in certain regions such as Los Angeles. In some downtown areas, automotive traffic is being limited significantly or prohibited altogether. To preserve the use of automobiles, manufacturers might promote light rail mass transit commuter trains as a more economical way of reducing regional emissions than the individual installation of emission control equipment on the new vehicle fleet. If operated in an efficient manner, mass transportation may lower family commuting costs, thus contributing to family disposable income. Insurance rates might be lowered because of reduced collision and theft claims. Of course, it should be remembered that a reduction of costs also equates to a reduction of another industry's revenues and employment base. Because of government budget limitations, community development patterns and ridership levels, public transportation and intelligent vehicle highway systems budgets continue to be a hot debate.

Expectations of manufacturer brand loyalty continue to be weak. With a continual introduction of well-built, high-value vehicles into the market, customers will always have a wide selection of vehicles on their shopping lists. Because of this, manufacturers must strive not only to position in the customer's mind the division's name, but also the manufacturer's name. We mention this because product introductions will continue to be made as soon as the product is ready for market. If a particular division is six months behind a direct competitor in launching a new product, that division might be taken off of the customer's shopping list ("There is nothing new here") if it does not have a strong corporate name standing behind it ("Are you shopping ABC Motors? I've heard they build the best").

MKT-3 Please estimate U.S. retail fuel prices, per gallon, for the following years. (Please do not adjust for inflation.)

Unleaded Gasoline	Est. 1992*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Unleaded regular	\$1.10	\$1.45	\$1.70	\$1.30/1.50	\$1.50/1.80
Unleaded premium	1.29	1.60	1.90	1.50/1.70	1.75/2.20

*Source: AAA December 1992 Survey. This was provided to the panelists as a baseline.

Selected edited comments

- Economic factors and taxes contribute almost equally to the 1998 increase. Beyond 1998, the tax effect is less important.
- I believe that there will be a raw materials and conversion cost component and that taxes will be 50 - 60 percent of increases.
- Price increases to 1998 are strictly from taxes. Taxes and environmental regulation will raise prices beyond 1998.
- Taxes and environmental regulation will be the primary drivers behind gas price increases. Supply will continue to outstrip demand.
- The federal deficit situation will demand further tax increases.

Discussion

Panelists forecast regular unleaded gasoline to increase from a 1992 year end base of \$1.10 per gallon to \$1.45 and \$1.70 per gallon in 1998 and 2003, respectively. The unleaded premium price forecast increases approximately at the same rate, climbing from 1992 year end at \$1.29 to \$1.90 in 2003. Governmental taxes and environmental regulations are expected to contribute the greatest amount to these increases.

Manufacturer/supplier comparison

The manufacturers' and suppliers' forecasts are generally all within 10 percent of each other. The exception is the median forecast for unleaded premium in 2003: The suppliers forecast a median unleaded premium price of \$1.90 per gallon, while the manufacturers forecast \$2.20 per gallon. This 16 percent difference may not be significant since it is the most distant forecast and both forecasts are well above today's prices (indicating similar product ramifications).

Comparison of forecast: TECH-1 and MAT-3

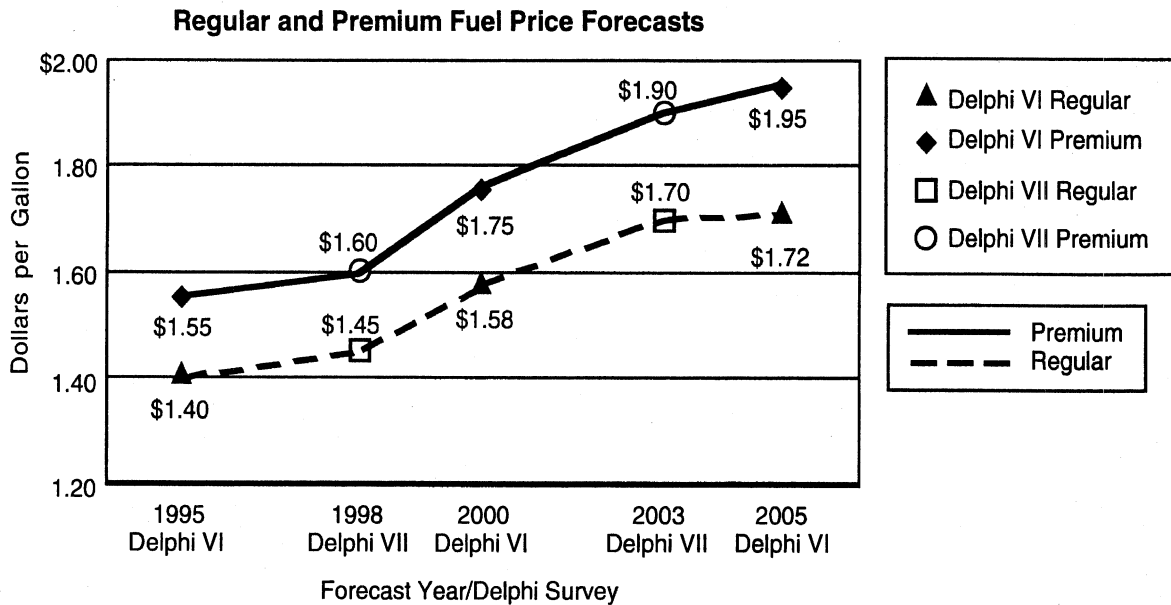
Results for the technology, marketing, and materials surveys are summarized in the following table. The panels are in general agreement, with each of the panels within 10 percent of each other.

Unleaded Gasoline	Est. 1992*	Median Response					
		1998			2003		
		MKT	TECH	MAT	MKT	TECH	MAT
Unleaded regular	\$1.10	\$1.45	\$1.40	\$1.35	\$1.70	\$1.75	\$1.68
Unleaded Premium	\$1.29	1.60	1.70	1.55	1.90	2.00	1.85

* Source: AAA December 1992 Survey. This was provided to panelists as a baseline.

Trend from previous Delphi surveys

The Delphi VII forecast numbers for unleaded regular and premium fall in line with the trend forecast established by the 1992 Delphi VI (see graph below). Both of these forecasts are significantly higher than the trend predicted by the 1989 Delphi V. This is most likely the result of expected higher taxes (state and federal) and environmental regulations (clean fuels, refinery emissions and service station vapor controls).



Strategic considerations

Our panelists predict an approximately 4 percent per year price increase in regular and premium brands. This is calculated over the 1992 year-end base. Gasoline prices, even including the fourth quarter 1993 federal gasoline tax increase, have declined below 1992 levels. However, our panelists believe a combination of taxes and environmental regulation will push up prices. It is interesting that the politics of oil—war, cartels, and the like—is not reflected in our panelists' comments. Perhaps this is because, at the time of this survey, the hot spots of the world were Eastern Europe and the former Soviet Union while the Middle East was pursuing historic peace initiatives. History proves this market to be stable. However, it should be remembered that short term volatility is always possible.

The greatest uncertainty is how the federal government will promote reductions in road transportation's use of petroleum. Will it move away from a corporate average fuel economy (CAFE) strategy to a tax-based incentive program? Will the legislature and President have enough political courage to raise gasoline taxes not 4 cents on the gallon, but 20 cents or more? There is increasing frustration over the mixed signals that regulation such as CAFE sends to the market. If federal regulation moves from its historic command and control style to a more market- and cost-benefit-driven process, as has been talked about through the super clean car initiative and other industry-government activities, then there may be the political will to increase gas taxes. Predicting political and other non-economic factors makes forecasting gasoline prices very difficult.

MKT-4 Assuming that a "good" sales year is defined as the sale of over 14 million passenger cars and light trucks in the United States, and 13 to 14 million and under 13 million define a "medium" and "weak" year, respectively, what is your expectation for the indicated years? Please indicate your probability (from 0 to 100 percent) of these volume scenarios occurring—such that the total probability across all scenarios adds to 100 percent for each year.

United States Light Vehicle Sales	Median Response			Interquartile Range			Total Probability
	>14 million "Good"	13-14 million "Medium"	<13 million "Weak"	>14 million "Good"	13-14 million "Medium"	<13 million "Weak"	
1994	50	40	10	40/60	30/50	5/10	100%
1996	50	40	10	40/60	30/40	5/10	100%
1998	42	42	16	35/50	35/50	10/20	100%
2000	43	38	19	35/55	30/50	10/20	100%
2002	40	40	20	40/50	30/40	10/20	100%
2004	48	38	14	40/60	30/45	5/20	100%

Selected edited comments

- It is difficult to forecast when recessions will occur. Demographics increase the odds of "good" years the further out we go.
- Only 1998 is deemed to be a recession year.
- Population growth will make all years after 1998 "good" years.
- The question implies no growth in trend (typical year) sales. We believe that trend growth is currently 200,000 vehicles per year, and that the market will increase 100,000 vehicles per year after 2000.
- The year 1996 offers both an election year and a UAW contract year. All parties will want it to be a good year.

Discussion

Our marketing panel is generally pessimistic regarding future U.S. sales forecasts. Only 50 percent of the panel believes that 1994 and 1996 markets will be greater than 14 million units. This is counter to some optimistic forecasts given in the 1993 fourth quarter that 16 and 17 million unit markets will occur by the mid- to late-1990s. It is logical that if these high forecasts were well accepted, more panelists would have assigned a higher probability to greater than 14 million unit markets.

Manufacturer/supplier comparison

Considering total market demand, the suppliers tend to be a bit more pessimistic. In no period do more than 50 percent of the suppliers rate any one forecast scenario. Fifty percent of the suppliers predict over 14 million unit years for 1994 and 1996. The next three periods, 1998, 2000, and 2002, are equally split: 40 percent of the suppliers believe these periods will be good markets while 40 percent believe these periods will be weak. The greatest percentage of manufacturers in each period expect future markets to be over 14 million units. Interestingly, the highest manufacturer votes for medium markets are 1994 and 1996, the periods for which suppliers are most optimistic.

Twenty percent of the suppliers forecast weak markets for the 1998, 2000, and 2002 periods. These markets are also the most risky in the eyes of the manufacturers (14, 15, 19, and 16 percent for periods 1998, 2000, 2002, and 2004, respectively). The manufacturers are generally more optimistic, but the suppliers and the manufacturers are generally in agreement. While both groups generally concur on the macro numbers, it is the micro numbers of nameplate and platform sales forecasts that cause the greatest disruption between a manufacturer and its supply base. The manufacturers tend to be overly optimistic on request for quote bids and production schedule forecasts as well. Perhaps this is the source of the suppliers' pessimism.

Trend from previous Delphi surveys

Past surveys defined market sales as weak, medium or good if sales were 14 million, 16 million or 18 million units, respectively. This survey uses under 13 million, 13-14 million, and over 14 million, respectively. Because of this, our panelists have shifted from medium to good market expectations. The 1989 Delphi V panelists were very bullish regarding 1990 and 1992 markets with 49 percent and 61 percent, respectively, of the panelists forecasting medium or 16 million unit markets. These forecasts have proven too optimistic. Therefore, we changed our definitions to better reflect structural changes that may have eliminated one million or more units from the market. The 1992 Delphi VI panelists were also too optimistic with 48 percent predicting the 1992 market would be approximately 16 million units. The long recovery may have jaded our panelists, and explains the strong split between medium and weak, even though we have redefined the market size downward by 1 to 3 million units.

Strategic considerations

Survival under the condition of historically average markets will be the centerpiece of automotive corporate strategies into the future. Between 50 and 60 percent of our respondents expect the markets to be between our weak and medium scenarios for the next 10 years. A good market, redefined to just 14 million units, could not muster a simple majority. Perhaps this uncertainty and lackluster expectations arise from the uncertainties that is expressed in questions one and two. There are many mixed signals from the political arena, consumer markets and industrial sectors.

The results of this question support MKT-29: panelists estimate 14.3 million units for the 1998 U.S. passenger car and light truck market and 15.2 million units for 2003. This is approximately a 1.5 percent annual growth rate from the 1992 base year. The years 2000 and 2002 are expected to be the weakest years in the upcoming decade. If these years are weak and the panelists' 1998 and 2003 forecasts are on target, then the industry may see the largest one- or two-year sales swing in a long time. Slow growth, the heavy use of rebates and lengthening trade-in cycles (which tends to spread out trade-ins from the previous peak sales year) have tended to minimize the U.S. sales cycles between peaks and valleys. It appears that the United States may experience a year-to-year sales variation of 1.5 to 2 million units or more.

There are many demographic changes occurring. As is pointed out in several comments, the baby boomers are moving through the population. Many are in or reaching the prime stages of their career (in terms of income) and family (in terms of marriage and children). This will "increase the odds of good years . . . further out" because those at the beginning of the baby boom generation will be in their fifties and those at the end will be in their forties. Incomes, inheritance wealth transfer and consumption patterns will affect not only total number new vehicle sales, but what types of vehicles are sold. Given the broad range of economic signals and possible demographic changes, successful suppliers and manufacturers must strive for the flexibility to respond effectively to changing market patterns.

MKT-5 Please indicate your view of the trend in U.S. federal regulatory and legislative standards over the short term (1994-1998) and long term (1999 to 2003) timeframe (where 1 = much more restrictive, 3 = no change, and 5 = much less restrictive). Also, list any likely new areas of legislative activity.

Legislation/Regulatory Activity	Mean Forecast	
	Short term 1994-1998	Long term 1999-2003
Anti-theft		
Passenger car	2.7	2.4
Light truck	2.7	2.5
Fuel economy standards (CAFE)		
Passenger car	2.1	1.9
Light truck	2.2	1.9
Occupant restraint/interior safety		
Passenger car	2.2	1.8
Light truck	2.0	2.5
Product liability		
Passenger car	2.5	2.5
Light truck	2.5	2.0
Vehicle integrity/crashworthiness		
Passenger car	2.2	2.0
Light truck	2.0	1.7
Vehicle emission standards		
Passenger car	2.0	1.7
Light truck	1.9	1.6

Other short-term responses include (followed by rating):

Recycling [4 responses] (2.5)

Single responses:

Fossil-fuel free vehicles (2.0), gas tax (2.0), road tolls (2.0), truck tariffs (1.0), trade legislation (2.0), safety—ABS for passenger cars (2.0), safety—ABS for light trucks (2.0)

Other long-term responses include (followed by ranking):

Recycling [4 responses] (1.5)

Single responses:

Fossil-fuel free vehicles (2.0), gas tax (2.0), road tolls (1.0), truck tariffs (1.0), trade legislation (1.0)

Manufacturer/supplier comparison

The manufacturers and suppliers are in general agreement.

Comparison of forecast: TECH-15 and MAT-5

Materials and marketing panelists are in agreement in all areas with one exception. The Marketing panelists rate long-term occupant restraint/interior safety for light trucks at 2.5, which is somewhat less likely than the 1.8 rating by technology panelists and 1.5 by the Materials panelists.

Trend from previous Delphi surveys

There is little difference when comparing Delphi VII's short term trends, which most closely match the 1992 Delphi VI's 1992 to 2000 and the 1989 Delphi V's 1988 to 2000 time frames. The major trends are a continued emphasis on truck standards and generally increasing regulations. Recycling, an increasingly important trend identified in the 1992 study, shows continued interest. For the first time, a majority of panelists believe product liability activity will increase, particularly for trucks.

Strategic considerations

Across all fronts—safety, fuel economy, emissions and operation (anti-theft and product liability)—the panelists forecast that the automobile will continue to face increasing regulations. While this question identifies the general magnitude of change, the true impact of regulation is a function of the overall objective (reduce transportation petroleum consumption), method of achievement (CAFE), the specific standard (trucks 20.4 mpg), test procedures, timelines and enforcement. These variables determine the cost and benefit ratios.

Generally, no one argues against the overall objectives of cleaner air, safer roads and extended petroleum reserves. Debates arise over the definition of the actual problem, the cause and affects, required remedies and cost. This debate is healthy when based on facts and figures, and identifies new knowledge bases. The debate may be counterproductive if based on emotion and speculation.

The panel estimates that the mean forecast for short- and long-term regulatory trends is approximately the same. However, the panelists believe light-truck occupant restraint and interior safety standards will be increasing at a greater rate than passenger cars in the short term, but at a lesser rate in the long term. This may be the result of the pace of current light truck standard implementation as these standards catch up with passenger car levels over the next five years. Having caught up over five years, the pace of implementation may be reduced. Product liability appears to be the opposite trend—an equal rate of increase over the short term with product liability in the long term becoming a greater light truck issue. This may follow the typical regulatory time lag where new issues gain attention in light trucks some five years later than passenger cars.

Given the scope of regulation that automobiles fall under and the complexity of the regulatory concerns, it behooves the industry to become intimately involved with the regulatory process. By this we do not mean fighting regulation when it comes before a public hearing, but being involved in the formulation of the regulatory policy itself. This is particularly important in an emerging regulatory activity such as recycling. There is a great deal unknown about the economics of recycling non-metallic materials.

There is also a great deal of emotion pushing federal and state lawmakers in directions that may have profound impact on design, material, and manufacturing decisions. The words from Washington during the last half of 1993 suggest that Washington is looking for a great deal of input from industry and is realigning its bureaucracy to take advantage of this input. The question for industry is how it will organize itself to streamline policy communication and analysis at a company and industry level. It appears that the Big Three have aligned many of their individual view points, such as on gasoline taxes. However, the suppliers and transplants with their many points of view do not have as good an opportunity for a collective voice.

MKT-6 Do you believe there will be retroactive application of current federal light-duty vehicle integrity and occupant safety standards on the existing fleet within the next five years (where 1= strongly agree, 3 = moderately agree, and 5 = strongly disagree)?

Vehicle	Mean Rating
Passenger car	4.0
Light truck	3.8

No comments

Discussion

Over the next five years, the panelists do not foresee the retroactive application of passenger car or light truck regulations. While lawsuits may attempt to establish a reason for a vehicle to meet current regulatory standards, the regulatory bodies will not.

Manufacturer/supplier comparison

There are no substantial differences between the two panels.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

This question was prompted by the 1993 General Motors full-size pickup safety litigation. Potential litigation awards seemed to be opening up the window for an onslaught of lawsuits and even potential legislation that would make manufacturers liable to bring products manufactured to meet previous standards up to current safety standards. Court cases will continue to be initiated for vehicles that were manufactured without such equipment as airbags, rear seat harnesses or antilock brakes. However, our panelists do not believe, in the near term, that legislation will be enacted that will retroactively apply current occupant safety standards to older vehicles. Manufacturers should continue, where feasible, to engineer in safety features that inevitably will be required on vehicles. In addition to being generally less expensive to engineer additional features into a new platform than an existing one, companies may gain additional market goodwill by beating federal standards and incorporating features which inevitably will become standard equipment.

MKT-7a Please consider the recent merger between the American Automobile Manufacturers Association (AAMA) and the United States Council on Automotive Research (USCAR) and the development of other research consortia. How will these developments affect the competitive balance among the Big Three and between the Big Three and their foreign competition?

Merger Consequences	Percent of total responses
Big Three versus foreign competition	
Increase competitiveness	75%
Little, moderate	25
Competition between the Big Three	
No change	50%
Tighten competition	50

Total N = 47

Other responses: Reorient competitive battles (3 percent), provide better U.S. government-industry relations (3 percent).

Selected edited responses

- Competitiveness between the Big Three will be less on the research and development portion, but strong competition will continue in marketing. The Big Three will have a competitive advantage over foreign competition.
- I do not look for the consortia to deliver large breakthroughs so I think the effect will be minimal.
- It is protectionistic.
- It should be beneficial to the Big Three against foreign competition and should narrow the capabilities of the Big Three between themselves.
- It will lead to more effective, efficient and timely Big Three introduction of cost-effective enhancements.
- The merger will lead to reduced costs in complying with government legislation.
- This is potentially good, but as yet undetermined. In such projects who will establish leadership that is necessary? Also, the temptation not to commit full resources to a consortia must be great, especially once the novelty has worn off.

Discussion

While there is uncertainty regarding the success of the various efforts, research consortia have the potential of changing the competitive balance between the domestic Big Three and foreign competition. There is an expectation that each Big Three firm will benefit, and that the competitive level of the traditional domestics will rise together. Individually, companies may benefit by redirecting resources freed up through collaborative work to competitive proprietary efforts.

Manufacturer/supplier comparison

These comparisons are not made for open-ended questions.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

The coordination of joint Big Three research projects through USCAR has the potential for more profound ramifications than any other structural change occurring in the world's automotive industry. By leveraging human, technical knowledge and financial resources, USCAR allows the consideration of research and development programs that are beyond the budgets of any one company. There are two key advantages that these consortia may yield to change the competitive battleground. First, the consortia provide an industry-wide base of data and knowledge. Given this information, individual company success is determined by a company's ability to convert ideas into action. Second, these consortia significantly alter allocation of capital. Companies which may not have had the individual resources to meet federal and state regulatory regulations alone may now have the ability not only to meet regulatory needs, but to produce competitive vehicle platforms and engines with a consortium.

Of course, the real question is how effective these consortia will be at R&D commercialization. This concern is raised in several comments. To be successful, programs must have a clear objective, share risks and rewards equally, be adequately funded in terms of human and financial capital, possess the right organizational structure and culture, and facilitate communication exchange. Fundamental to the question of effectiveness is the question "How should these consortia be judged?" Traditional measures such as patent applications and new product introductions may not be adequate.

Comments regarding the protectionist nature of consortia have merit. However, one of the structural advantages researchers identified with Japan is its strong government-industry R&D programs with clearly nationalistic objectives. Europe, as well, has supported such strong nationalistic programs. The U.S. companies have been backed into the corner in terms of financial and market share losses, and are now fighting back. This form of retaliation from U.S. companies is a significant variation from historic competitive rules. In the past, American companies had market share, financial reserves, and excessive slack in production and development systems that allowed a gradual erosion of competitive position without response. Today, every company is at a minimum level, or critical mass, of these measures. To dip below this critical mass jeopardizes the long-term competitive strength of a company. The natural reaction is to fight back with every weapon available. Consortia provide the potential benefits of increased competitiveness, reoriented competitive battles and better industry-government relations.

MKT-7b In addition to the existing consortia in electric batteries, low emissions, composites, recycling and others, what potential areas have merit for joint research activities?

Potential Joint Research Activities	Percent of total responses
Alternative fuels (including natural gas, electric, and solar)	25%
Safety designs and components	17
Manufacturing and process cost reductions	13
Intelligent Vehicle Highway Systems (IVHS)	8
Fuel economy improvements	8
Material developments (including adhesives)	8

Total N = 46

Other single responses include: aerodynamics, emission controls, ergonomic designs, industrial relations, recycling, reduction of component complexity, stationary emissions, testing, theft and two-cycle engines.

Discussion

Alternative fuels, safety designs and manufacturing are likely candidates for joint R & D consortia activities. The broad range of responses shows many potential cooperative opportunities from regulatory to environmental and material.

Manufacturer/supplier comparison

These comparisons are not made for open-ended questions.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

This question identifies a number of joint research opportunities for the vehicle manufacturers and suppliers. The major emission reduction requirements established by the federal Clean Air Act and state initiatives place alternative fuels at the top of the consideration list. Fuel development, emission testing, component durability prove-outs and other required activities take significant time as well as human and financial capital. By leveraging a wider resource base, common bases of knowledge may be built. The second identified activity, safety design, carries with it significant development efforts as well. Safety design also opens up the consideration of not only joint research funding, but joint fixed investment as well. Facilities such as vehicle simulators, too expensive for any one manufacturer to justify on its individual needs, become realistic if the business plan includes a dozen users instead of just one.

While difficult to define pre-competitive joint research, the first two areas offer numerous opportunities for shared activities. At first investigation, reduced manufacturing and process costs appear to involve elements closer to manufacturing price and competitiveness—elements on the fringe of anti-trust violations. However, in manufacturing there are great opportunities to commonly develop new process methodologies and measurement techniques. The focus should be on broad manufacturing developments, not the refinement of a particular process unique to one capital equipment supplier or vehicle manufacturer's product (e.g., the Auto Composites Consortium).

The single responses identify many potential projects that may not yet have been pursued in any joint form. These include aerodynamics, ergonomic designs, testing and anti-theft systems. Some of these ideas, such as aerodynamics and testing, are attractive because of the opportunities to share large fixed capital expenses and computer simulation time. Other areas, such as anti-theft, are attractive consortia activity because they involve a large number of individual stakeholders (vehicle manufacturers, suppliers, insurance companies and law enforcement).

MKT-8 Many countries have the potential of becoming influential in vehicle and component manufacturing and offer significant market opportunities. Please indicate your opinion of the manufacturing and marketing environment in these countries by the year 2003, where 1 = highly agree, 3 = neutral, and 5 = highly disagree.

Country	Mean Rating		
	Will Approach 2003 World Cost and Quality Standards		Will Be a Profitable 2003 Market
	Vehicle Production	Component Production	Vehicle Sales
Czechoslovakia	3.2	2.8	2.7
China, Peoples Republic of	3.4	2.9	3.0
Poland	3.4	2.9	2.8
Hungary	3.5	2.9	2.9
India	4.0	3.4	3.3

Other responses include:

Country	Vehicle Production	Component Production	Vehicle Sales
Mexico (4 responses)	1.5	2.0	2.0
Brazil (1 response)	2.0	1.0	2.0
Russia (1 response)	5.0	5.0	5.0

Discussion

The marketing panel is neutral regarding the production and market potential of several developing countries. While this opinion snapshot may not indicate high expectations about these countries, it is important to consider the trend from previous Delphi surveys. A two-year comparison indicates a substantial improvement in the perception of China, and slight improvements toward Czechoslovakia, Hungary and Poland. India is not as well perceived in vehicle production capabilities, but it should not be overlooked for component production and market sales potential.

Manufacturer/supplier comparison

There is a slight disagreement over the Peoples Republic of China. The suppliers are slightly more optimistic about China's supply base, rating component production a slightly positive 2.8 versus the manufacturers' rating of 3.2. In terms of a profitable vehicle market, the suppliers are neutral at 3.0 while the manufacturers are a bit more positive at 2.7. We do not believe that these differences will result in any fundamental shift in investment strategies.

Trend from previous Delphi surveys

Clearly the country making the most perceived progress is the Peoples Republic of China. Our 1992 Delphi VI panelists were very pessimistic about China's opportunities rating vehicle production, component production, and vehicle markets 4.4, 4.0 and 3.6, respectively. While the overall panel is still neutral about China's ability to produce world class vehicles and market profitability, the panel's opinion has crossed into the positive realm for component production. The previous survey was taken at a time with fresher memories of student unrest and political instability. There has also been a dramatic shift towards the positive in China's trade and hard currency position.

There has been a slight improvement in the attitudes towards Czechoslovakia, Hungary and Poland. The table below presents data from the 1992 Delphi VI. The question was worded in the exact same manner, except the 1992 Delphi VI probed the year 2000.

1992 Delphi VI Results	Mean Rating		
	Will match 2000 world class cost and quality standards		Will provide a profitable 2000 market
	Vehicle production	Component production	Vehicle sales
Czechoslovakia	3.3	3.0	2.5
Hungary	3.4	3.1	2.6
Poland	3.4	3.1	2.7
China, Peoples Republic of	4.4	4.0	3.6

Strategic considerations

Even considering investment and strategy difficulty, countries struggling to open trade and investment opportunities continue to hold interest. The variability of competitive perception among the panelists has narrowed, except for India which remains a relatively closed country and far behind in terms of development expectations. Except for India, each of these emerging countries is rated relatively positive in terms of component production and vehicle markets. Because vehicle production standards have advanced so rapidly, vehicle production expectations remain negative.

The most significant development is the change in attitude toward China. While still seen as a long term investment strategy, China is considered a major investment opportunity because of the potential of its people and its position within southeast Asia as a production base. This potential, linked to generally positive political and economic developments, has driven China from the 1992 Delphi VI's fifth place standing to second in terms of vehicle production potential. We rate the countries based on these criteria, because we believe that it is easier to build core competencies in the component industry and develop market channels and vehicle affordability before a country becomes a major vehicle production source.

As these nations develop production capabilities and markets, it will be interesting to follow the foreign direct investment patterns of the world's major automotive producers. Concentration of automotive production bases and investment has spread from the United States to Europe and from Europe to Japan. Major new investment has come into North America, building up its production and export base. Mexico may emerge as a major producer and consumer of automotive products. China, Eastern Europe and other Pacific Rim countries may rapidly develop as well. These new investment opportunities force companies to reapportion investment. Based on these decisions, the next major automotive production center may emerge.

MKT-9 What are the five most essential product and non-product qualities that a vehicle manufacturer must deliver to a customer in order to enhance brand loyalty?

Quality	Percent of total responses
Dealership relations	23%
Value	17
Vehicle quality	15
Style	10
Reliability	8
Product performance	5
Safety	5
Durability	3
Product innovation	3
Warranty	3

Other responses included: Comfort (2 percent), product image (2 percent), resale value (2 percent), and operating cost (2 percent).

Selected edited comments

- Consumers need security that transportation will always be available, including road service and replacement transportation.
- Manufacturers and dealer actions affect brand loyalty. Many times the dealer, the customer's primary contact, is critical of the manufacturer. Also there are too many "sleazy" dealers. The manufacturers should begin a campaign to promote a love affair between the manufacturers and the dealer. It is critical that the dealers and manufacturers present a good image and common approach. Also manufacturers need to weed out bad dealers.
- People want to be perceived as stylish and intelligent in making their car-buying decisions.

Discussion

Brand loyalty—a customer's propensity to repeat purchase—is a function of the vehicle manufacturer, product and distribution channel. A nonproduct attribute, dealership relations, is one of the most significant opportunities manufacturers have to create brand loyalty. Overall value, vehicle quality and style are the next three attributes panelists believe manufacturers need to enhance.

Manufacturer/supplier comparison

These comparisons are not made for open-ended questions.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

It is obvious that in regards to building brand loyalty and name equity, the dealer is on the front line. The quality of a dealer-customer relationship is critical to the manufacturer. While dealer relations is the panelists' number one response, there are a number of responses that could be considered secondary but equal in strategic importance. Value encompasses the total purchase and ownership experience. Vehicle quality certainly involves the design and manufacturing expertise of the manufacturer, but also includes the repair skills of a dealer's technicians.

While difficult to quantify, it is generally understood that the first sale made to a customer is the most expensive. Advertising budgets, rebates, direct mail, dealer time, manufacturer and dealer margins, and other costs or lost revenues are significantly higher to move a customer out of a current vehicle and into another manufacturer's product. Once this purchase decision is made, keeping a customer happy in terms of warranty coverage, service satisfaction and sales followup positions a manufacturer and dealer for a very low-cost second sale.

However, this perspective requires a five- or six-year time horizon—the typical first owner period. This perspective includes the dealer in any quality or value enhancement program. This perspective judges quality not on 90 days of ownership, but three to six years. Manufacturers must look at their dealers as assets, not adversaries. The manufacturers must change their perspective that the dealers are just sales outlets. The dealers, being on the front line, are the manufacturers' marketing watch post and customer satisfaction centers.

MKT-10a True total customer satisfaction is difficult to quantify. Please select from the following list the five most important considerations you believe influence current passenger car buying decisions in each segment. Please do not attempt to rank these attributes; simply indicate the five characteristics you believe are the most important initial considerations to the customer today, and in 1998. The table below presents the number of panelists' responses.

Number of Total Responses			
Entry Level		Intermediate	
1994	1998	1994	1998
1. Purchase price (60)	1. Purchase price (53)	1. Product quality (39)	1. Safety (35) Purchase price (35) Product quality (35)
2. Fuel economy (47)	2. Fuel economy (43)	2. Safety (36)	2. Passenger/cargo space (32)
3. Operating cost (40)	3. Operating cost (41)	3. Space (35) Purchase price (35)	3. Comfort options (27)
4. Incentives (35)	4. Product quality (34)	4. Exterior styling (28)	4. Exterior styling (22)
5. Product quality (34)	5. Incentives (21)	5. Comfort options (27)	5. Operating cost (20)
6. Exterior styling (22)	6. Exterior styling (19)	6. Operating cost (24)	6. Fuel economy (19)
7. Corporate reputation (15)	7. Safety (18)	7. Fuel economy (17)	7. Performance (14)
8. Safety (14)	8. Corporate reputation (16)	8. Incentives (16)	8. Corporate reputation (13)
9. Vehicle performance (8)	9. Vehicle performance (11)	9. Corporate reputation (15)	9. Incentives (11)
10. Passenger/cargo space (6) Comfort/convenience options (6)	10. Passenger/cargo space (5) Comfort options (5) Status (5)	10. Performance (10)	10. Interior styling (6)

Luxury	
1994	1998
1. Comfort options (45) Exterior styling (45)	1. Exterior styling (43)
2. Status appeal (43)	2. Status appeal (38)
3. Product quality (37)	3. Comfort options (37)
4. Interior styling (32)	4. Product quality (33)
5. Vehicle performance (23)	5. Interior styling (25)
6. Corporate reputation (21)	6. Vehicle performance (22) Product technology (22)
7. Safety (20)	7. Safety (19)
8. Product technology (19)	8. Corporate reputation (18)
9. Purchase price (4)	9. Purchase price (6)
10. Passenger/cargo space (4)	10. Operating cost (4)

Selected edited comments

- Comfort/convenience options and styling are a given for luxury cars.
- Price is king and perceived value is a close second.
- Product quality is expected at each level.
- Quality will be a given by 1998. After 1998, innovation and service will drive buying decisions.
- Safety is almost a non-factor. It is required.

- Service is not addressed here, but it could be a major factor in future years if exploited!
- We do not believe that the average person calculates operating cost.

Discussion

Success in the entry level segment will likely be achieved by products delivering value primarily defined by purchase price, fuel economy and operating cost. Intermediate vehicle buyers will demand differentiation on purchase price also, with serious consideration given to product quality, safety, passenger and cargo space, and comfort and convenience options. Comfort and convenience options, exterior styling, status appeal and product quality are attributes luxury car buyers will demand.

Manufacturer/supplier comparison

The suppliers and manufacturers include similar attributes in the top five rankings. Because there are only 13 vehicle manufacturer responses, the manufacturers tend to have more attributes which receive the same number of votes. Therefore, a larger number of attributes (typically six or seven) receive the top five votes. The table below presents any variation (as defined by inclusion or exclusion within the top five votes) between the two panels. It does not appear that any particular difference denotes a variation of intent or strategy between the two groups.

Entry Level		Intermediate	
1994	1998	1994	1998
Suppliers included (and the manufacturers did not) in their top 5: 5. exterior styling (18)	Suppliers included (and the manufacturers did not) in their top 5: 5. incentives (19)	Suppliers included (and the manufacturers did not) in their top 5: 5. operating cost (20)	Manufacturers included (and the supplier did not) in their top 5: 2. exterior styling (7) 3. corporate reputation (6) 5. operating costs (4)
Manufacturers included (and the supplier did not) in their top 5: 3. corporate reputation (6) 5. safety (4)	Manufacturers included (and the supplier did not) in their top 5: 4. corporate reputation (7) 5. safety (5)	Manufacturers included (and the supplier did not) in their top 5: 2. exterior styling (8) 3. safety (7)	

Luxury	
1994	1998
Suppliers included (and the manufacturers did not) in their top 5: 4. interior styling (26) 5. product technology (17)	Suppliers included (and the manufacturers did not) in their top 5: 5. interior styling (20)
Manufacturers included (and the supplier did not) in their top 5: 2. corporate reputation (9) 3. safety (7)	Manufacturers included (and the supplier did not) in their top 5: 2. corporate reputation (8) 5. safety (5) 5. vehicle performance (5)

Trend from previous Delphi surveys

Compared to the 1992 Delphi VI, which asked a similar question on current buying decisions, some important changes have occurred. Primarily, the job of the vehicle manufacturer has become harder because it now has to satisfy more attributes in each segment. In the entry-level segment, product quality re-emerges within the top five criteria. For the family buyer, fuel economy is not viewed as an important test. However, passenger and cargo space packaging and comfort and convenience options are added to the list. Luxury criteria remains the same as before, and perceived product performance is a top five differentiator.

Strategic considerations

The consumer motivations that drive a \$10,000 to \$50,000 purchase decision may be simple or complex, static or evolving, straightforward or contradicting. Understanding, anticipating and delivering on these motivations is what differentiates companies and nameplates. Companies are being required to deliver more and more to the customer at an equivalent price. This is the process of increasing consumer value.

Companies must maximize a multivariable purchase equation—which is somewhat unique for every market segment, let alone for every customer—without sacrificing or compromising attributes customers value the greatest. Because consumer wants are always changing, we believe it is dangerous to claim quality or

safety is a given. Perhaps they are in concept, but what about practice? Do we truly understand the customer's definition of quality? Is it a non-issue if 90-day quality surveys show manufacturer parity while 2- and 3-year surveys and warranty cost expenditures show different? Safety today is typically defined by available antilock brakes and air bags. But, increasingly, integrated child safety seats and cellular phones are being identified as safety items. Achieving yesterday's standard does not make for tomorrow's competitiveness. The customer and the competition are moving, not static, targets.

Manufacturers must increasingly deliver value to the customer. In reviewing the top 10 requirements for each segment, we find that the priorities may change a bit between 1994 and 1998. However, in only one case (in the 1998 luxury segment) does an attribute (passenger/cargo space) fall out of the top ten requirements. In every other case, additional attributes are added to an established requirements list. In fact, the customer satisfaction equation becomes more complex. It is forecast that in 1998 status appeal will become a consideration for entry level buyers. Of course, purchase price remains the number one constraint. So status must be delivered not by a designer label and a higher price, but by market positioning or some other non-product (i.e., means service). Interior styling in 1998 is added as a key priority of intermediate and family buyers. Luxury buyers, not known for their concern for costs, are even expected to add operating costs to their list of considerations.

MKT-10b Please select from the following list the five most important considerations you believe influence current personal use light-truck buying decisions in each segment. Please do not attempt to rank these attributes; simply indicate the five characteristics you believe are the most important initial considerations to the customer today, and in 1998. The table below presents number of responses.

Compact Van		Sport Utility	
1994	1998	1994	1998
1. Passenger/cargo space (44)	1. Passenger/cargo space (39)	1. Status (36) Exterior styling (36)	1. Exterior styling (33)
2. Purchase price (36)	2. Purchase price (34)	2. Vehicle performance (31)	2. Vehicle performance (31)
3. Comfort/ convenience options (33)	3. Comfort/ convenience options (32)	3. Comfort/convenience options (28)	3. Status appeal (28)
4. Product quality (30)	4. Safety (29)	4. Product quality (27)	4. Comfort/ convenience (27)
5. Safety (26)	5. Product quality (27)	5. Passenger/cargo space (23) Towing capacity (23)	5. Product quality (21)
6. Interior styling (19)	6. Interior styling (19)	6. Product technology (16) Purchase price (16)	6. Passenger cargo space (20)
7. Exterior styling (18)	7. Fuel economy (18)	7. Interior styling (15)	7. Towing capacity (18)
8. Fuel economy (17)	8. Exterior styling (15)	8. Corporate reputation (11) Safety (11)	8. Product technology (17) Purchase price (17)
9. Operating costs (12)	9. Operating costs (13)	9. Incentives (6)	9. Safety (15)
10. Incentives (11)	10. Vehicle performance (11)	10. Operating costs (3)	10. Interior styling (14)

Pickup	
1994	1998
1. Purchase price (38)	1. Purchase price (35)
2. Product quality (33)	2. Passenger/cargo space (28) Operating cost (28) Vehicle performance (28)
3. Passenger/cargo space (31)	3. Product quality (26)
4. Vehicle performance (29)	4. Corporate reputation (24) Towing capacity (24)
5. Operating costs (28) Towing capacity (28)	5. Incentives (14)
6. Corporate reputation (27)	6. Fuel economy (13)
7. Incentives (14)	7. Exterior styling (11)
8. Fuel economy (12) Exterior styling (12)	8. Safety (10)
9. Comfort/ convenience options (7)	9. Comfort/ convenience options (8)
10. Product technology (3) Interior styling (3) Safety (3)	10. Product technology (5)

Selected edited comments:

- Another consideration is garage space for compact van in both 1994 and 1998.

Discussion

While it is common to refer to all light trucks together, customers differentiate the three light truck major categories in very different ways. Our panelists believe compact van buyers today and in 1998 will critique products on passenger and cargo space, purchase price, and comfort and convenience options. Persons interested in sport utilities judge these vehicles based on status appeal, exterior styling, vehicle performance, and comfort and convenience options. The pickup market is expected to become extremely competitive. Our panel believes shoppers differentiate pickups today on purchase price, product quality, and passenger and cargo space. In 1998, customers will demand these features and competitive operating costs and vehicle performance.

Manufacturer/supplier comparison

As in question 10a, the suppliers and manufacturers include similar attributes in the top five rankings. Because there are only 13 vehicle manufacturer responses, the manufacturers tend to have more attributes which receive the same number of votes. Therefore, a larger number of attributes (typically six or eight) receive the top five votes. The table below presents any variation (as defined by inclusion or exclusion within the top five votes) between the two panels. It does not appear that any particular difference denotes a variation of intent or strategy between the two groups.

Perhaps the most significant difference is that for 1998 the suppliers drop product quality out of the top five criteria for sport utilities (it ranks sixth). This is the first true response by our panelists that supports the comment that quality will not differentiate future products.

Compact Van		Sport Utility	
1994	1998	1994	1998
Suppliers included (and the manufacturers did not) in their top 5: 1. purchase price (32) 5. fuel economy (17) Manufacturers included (and the supplier did not) in their top 5: 5. corporate reputation (5)	Suppliers included (and the manufacturers did not) in their top 5: 1. purchase price (30) Manufacturers included (and the supplier did not) in their top 5: 5. corporate reputation (5)	Manufacturers included (and the supplier did not) in their top 5: 1. passenger/cargo area (8) 4. corporate reputation (5) 4. safety (5) 5. towing capacity (4)	Manufacturers included (and the supplier did not) in their top 5: 1. passenger/cargo space (8) 2. product quality (6) 3. corporate reputation (5) 4. safety (4) 4. towing capacity (4) 5. interior styling (3)

Pickup	
1994	1998
Manufacturers included (and the supplier did not) in their top 5: 5. exterior styling (4)	Suppliers included (and the manufacturers did not) in their top 5: 5. towing capacity (20) Manufacturers included (and the supplier did not) in their top 5: 2. corporate reputation (7)

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

The responses to this question indicate that trucks will become even more differentiated and passenger car-like in the future. While there are three basic types of trucks, these three types must satisfy a large range of customer demands. Compact vans must satisfy interior packaging and price demands. Sport utilities must deliver status appeal and exterior styling. Pickups must stress price and product quality. Just focusing on the expected top three future purchase criteria, we find that the segments will demand unique

attributes. Comfort and convenience is a top three requirement of only compact vans. Status appeal, product technology, and interior and exterior styling are unique top three requirements of sport utilities. Finally, operating cost and product quality are a top three priority of only pick up truck buyers.

Because of these additional demands, suppliers will have significant opportunities to support expanding content demands of products whose market size is growing—the best of both worlds. This market expansion will be challenging as part of the market is pushed toward new, high priorities such as product technology, corporate reputation and vehicle performance, while the fundamentals of the business—towing capacity, vehicle performance, operating costs and product quality—remain strong.

MKT-11 Please estimate, in constant 1993 dollars, *Manufacturers' Suggested Retail Prices (MSRP)* in 1998 and 2003 of a base model in each of the given segments. Please estimate, in constant 1993 dollars, *manufacturers' suggested retail prices (MSRP)* in 1998 and 2003 of a base model in each of the given segments.

MSRP	Estimated 1993 Model Year (MY)*			1998 Median Response			1998 Interquartile Range		
	Big Three	Japanese nameplate	European/other	Big Three	Japanese nameplate	European/other	Big Three	Japanese nameplate	European/other
Passenger Car									
Entry level	\$9,762	\$10,112	\$9,219	\$10,738	\$11,350	\$10,500	\$10,200/11,000	\$11,000/11,700	\$10,000/11,000
Intermediate/family	16,186	15,200	19,056	17,500	17,700	20,500	17,000/18,000	17,000/18,000	19,900/21,000
Luxury	34,275	33,499	43,583	38,000	38,000	45,000	36,500/38,000	37,500/39,200	45,000/48,000
Light Truck									
Pickup	\$10,694	\$10,208	NA	\$12,000	\$12,000	\$12,000	\$11,500/12,000	\$11,500/12,000	\$11,500/13,000
Sport utility	16,746	17,774	\$44,500	18,000	19,400	45,000	18,000/19,000	18,500/20,000	30,000/48,000
Van	18,563	16,617	17,130	20,000	19,300	20,000	19,000/20,300	18,300/20,000	18,700/20,300

MSRP	2003 Median Response			2003 Interquartile Range		
	Big Three	Japanese nameplate	European/other	Big Three	Japanese nameplates	European/other
Passenger Car						
Entry level	\$12,000	\$12,750	\$12,000	\$11,200/12,700	\$12,000/13,000	\$11,000/13,000
Intermediate/family	19,000	19,600	22,000	18,000/20,000	19,000/20,500	21,000/23,000
Luxury	40,000	42,000	50,000	38,000/43,000	40,000/44,440	46,062/52,000
Light Truck						
Pickup	\$13,000	\$13,000	\$13,225	\$12,000/13,500	\$12,300/13,800	\$13,000/14,000
Sport utility	20,000	21,000	46,000	19,000/21,000	20,000/22,000	28,000/51,000
Van	21,000	21,500	20,000	20,000/22,000	20,700/22,500	20,000/24,947

* Source: *Ward's Automotive Reports*, November 1992. This was provided to the panelists as a baseline.

Selected edited comments

- As the Japanese localize truck production, the U.S. pick-up truck market will finally feel the competitive pressures which have been exerted on the passenger car market.
- Continuing high levels of competition and increased North American sourcing by the Japanese will drive prices together.
- European sport utility vehicles are really luxury class passenger vehicles.
- I believe 3 percent per year increases through 2003, on average, is reasonable.
- I expect domestics to increase MSRP about 4 percent a year in current dollars and imports to increase MSRP at a slightly higher rate of 5 to 6 percent annually.
- Japanese luxury cars will be produced and marketed as a better value in order to try to command a higher price.
- Japanese vehicles' prices are typically equal or exceed U.S. manufacturers' prices due to the continuing strong yen.

- Minivans, and to a lesser extent, sport utility vehicles, will find excess product which will lead to intense price competition.
- Prices of popular light trucks will increase faster than cars as demand for trucks continues to grow.
- These Big Three and European increases will regrettably be necessary due to the inability of these companies to manage costs.

Discussion

Price pressure will remain intense as average MSRPs are forecast to rise moderately (2 to 4 percent) per year through the year 2003. Of course, individual vehicles in demand will be able to command higher price increases, and manufacturers facing rising costs will need to adjust accordingly. The panelists forecast that by 2003 the average intermediate family vehicle sticker will be over \$20,000, if an average bundle of options are added to the expected base price of \$19,000. Annual light truck prices are expected to rise similar levels.

Manufacturer/supplier comparison

There is no substantial difference between the two panels.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

The forecast annual percentage changes are presented in the table below. While it is a mixed bag, it appears that panelists believe that the next five years will be very tight in terms of price flexibility. Pricing increases in the 1999 to 2003 model year time frame increase at a faster rate than in the first part of the decade. However, producer prices, health care costs, materials and regulated product content increases will force improved efficiencies in order to remain profitable given these revenue constraints.

Vehicle Segment	Annual Percent Change Forecast					
	Big Three		Japanese		Europe/ other	
	1993-1998	1999-2003	1993-1998	1999-2003	1993-1998	1999-2003
Pass Car						
Entry level	1.9%	2.3%	2.3%	2.4%	2.6%	2.7%
Intermediate/family	1.6	1.7	3.1	2.1	1.5	1.4
Luxury	2.1	1.0	2.6	2.0	0.6	2.1
Light Truck						
Pick up	2.3	1.6	3.3	1.6	—	2.0
Sport utility	1.5	2.1	1.8	1.6	0.2	0.5
Van	1.5	1.0	3.4	2.2	3.0	0.0

Price differentials between Big Three and Japanese products are expected to continue to increase. The current entry level differential of \$350 is forecast to increase to \$750 by 2003. Likewise, intermediate/family segment price differentials reverse from a Japanese advantage of \$986 in the 1993 model year to a \$600 disadvantage by 2003—and luxury prices reverse from a Japanese advantage of \$776 to a disadvantage of \$2,000. Part of these changes reflects product strategy changes (the Japanese are moving up market with even greater numbers of entries in the family and upper luxury markets) and manufacturing cost increases.

From this information, it appears logical that the Japanese manufacturers will continue to press hard their educational campaign on total vehicle cost—that it includes not just the purchase price, but repairs, lost time and lower resale values. This effort will attempt to dispel \$2,000 purchase differentials. Of course, the real issue is whether consumers will trade \$2,000 today for a potential future gain. Most people argue that consumers tend not to value future consumption or returns.

There is another word of caution concerning the fourth quarter 1993 rise in Japanese prices. The part of these price rises which are attributed to currency exchange rates should not be counted on by American business as an advantage. The yen may fall just as easily as it rose. Competitive advantage is not achieved through a change in currency rates, but by a combination of financial and capital investment strategy, manufacturing competence and product design excellence. We wonder if the Japanese, once they truly

globalize their automotive production, sourcing and marketing, might be in a position to take advantage of currency exchange hedging. Already the Japanese are increasing exports of vehicles from the lower cost United States base. It is very difficult to balance capacity on a worldwide level. However, once domestic content rates equalize for production bases in each of the major producing regions, the opportunity exists to balance currently exchange rate variations at a corporate level.

MKT-12 Please estimate the average transaction price, in constant 1993 dollars, for vehicles sold in the United States in 1998 and 2003.

Average Transaction price	Est. 1992*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Passenger car					
Traditional domestic	\$16,922	\$18,300	\$20,000	\$17,500/19,460	\$18,000/22,000
Foreign	19,836	21,000	23,000	20,500/22,800	21,000/25,300
Light truck					
Traditional domestic	n/a	\$16,000	\$18,000	\$15,000/18,000	\$16,500/19,200
Foreign	n/a	17,000	18,700	15,000/19,000	17,000/22,000

*Source: AAMA, *Economic Indicators*, 4th quarter 1992. This was provided to the panelists as a baseline.

n/a = not available.

Selected edited comments

- The desire for more fuel efficient vehicles and less disposable income will influence an overall product mix change towards smaller cars.
- The drive by offshore manufacturers to gain luxury share will continue.

Discussion

The average transaction price differential, across all makes, between the traditional domestic and foreign manufacturers is forecast to remain approximately \$3,000 over the next 10 years. Traditional domestic make transaction prices are forecast to rise from a 1992 base of \$16,922 to \$20,000 in 2003. Light truck prices are expected to climb to within approximately 10 percent of passenger car prices by 2003.

Manufacturer/supplier comparison

There is no substantial difference between the two panels.

Trend from previous Delphi surveys

The previous Delphi studies have consistently underestimated transaction prices of domestic and imported vehicles. The 1989 Delphi V panelists forecasted 1995 domestic transaction prices at \$15,000 and \$16,000 for imported vehicles. These forecasts were, of course, far exceeded by 1992. The 1992 Delphi VI was more accurate with a 1995 domestic forecast average of \$16,500 and \$18,000 for imported vehicles. These underestimates are the result of mix variation, regulatory content uncertainty and option specification underestimation.

Strategic considerations

While our panelists expect the domestic transaction price to rise approximately the same per year as the MSRP (1.6 percent), the transaction price of foreign nameplate vehicles is expected to grow only 1.5 percent per year versus an MSRP average increase of 2.6 percent. While our panelists have underestimated the total growth of transaction prices, this difference is interesting. It indicates that the foreign car dealer may expect a smaller margin from new vehicle sales, and foreign vehicle manufacturers may increase the amount of sales and marketing incentives to soften the impact of rising MSRPs. It may also indicate the initial pressures for foreign manufacturers to fill up capacity and drive fixed costs per unit down by pursuing fleet and program sales.

This will create a pricing battleground. The manufacturers having the greatest efficiencies will, in turn, have the greatest war chest to fight these battles. This question supports the importance of value as a market differentiator (see MKT-9 and MKT-10). It also raises important considerations about affordability (see MKT-15).

MKT-13 One-price, no-negotiating retailing has become a major selling tool within certain segments and regions of the country. Do you believe this will become a more predominant method of passenger car and light truck retailing over the next five years? Please indicate your answer where 1 = substantially increase, 3 = no change, and 5 = substantially decrease.

1994-1998 One-Price Sales Trend	Mean Forecast
Passenger car	2.1
Light truck	2.2

Selected edited comments

- I believe a one-price approach will help eliminate the need for incentives.

Discussion

One-price retailing for passenger cars and light trucks will continue to hold the industry's interest. As value-based pricing becomes the focal point of decision making, manufacturers and dealers will experiment with one-price strategies at a dealership, nameplate or car division level.

Manufacturer/supplier Comparison

There is no substantial differences between the two panels.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

While the label of many current marketing strategies may read value-pricing and not one-price, there is an obvious trend towards reducing the hassle, variability and time involved in the purchase of an automobile. Many vehicle manufacturers are trying to "Saturnize" their dealership networks by reducing or eliminating price negotiation, salesperson pressure and customer dissonance. It will be interesting to track this trend and to identify any major changes in consumer satisfaction, dealer profitability and dealer franchise value. This is part of an overall effort to increase consumer loyalty (see MKT- 9).

MKT-14 What do you expect will be the average new passenger car loan amount financed, in constant 1993 dollars, and the average maturity, in months, in 1998 and 2003?

Passenger Car Loans	Est. 1992*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Average amount financed	\$12,494	\$14,000	\$14,730	\$13,000/14,500	\$13,400/16,000
Average maturity (in months)	55 months	55	58	50/60	50/60

* Source: AAMA, *Facts and Figures*, 1992. This was provided to the panelists as a baseline.

No comments

Discussion

Questions MKT-11 and MKT-12 suggest that panelists expect average vehicle prices to rise from \$12,494 in 1992 to \$14,730 by 2003. The difference—\$2,236 or nearly 18 percent—is forecast to add three more months of payments to the 55-month average for 1992. At 8 percent interest, this difference equates to \$30 per month in higher loan payments.

Manufacturer/supplier comparison

There is no substantial difference between the manufacturers and suppliers for the average amount financed forecasts. While the panels' 1998 forecast of average maturity length is within one month, the suppliers forecast 59 months as the average 2003 maturity and the manufacturers hold constant at 55 months. This difference indirectly supports the manufacturers' stronger preference toward personal leasing (MKT-15).

Trend from previous Delphi surveys

The 1989 Delphi V forecast a 55-month average for 1995 and 60 months in 2000. The 1992 Delphi VI lowered these expectations to 55 months and 57 months in 1995 and 2000, respectively. It appears that these forecasts are reasonable given today's market conditions.

Strategic considerations

The forecast amount financed is in line with expected increases in transaction prices, approximately 1.5 percent per year between the base year and 2003. At 8 percent interest, a \$12,500 loan for 55 months equals approximately a \$270 per month payment. The great rise in purchase prices, compounded by weak increases in household income, has raised the average vehicle expenditure to approximately one-half of average annual family household income. The 2003 forecast of \$14,730 for 58 months pushes the average monthly payment to \$305 per month. This is driving the popularity of personal leasing.

MKT-15 Please estimate, in percent, the financing method for new passenger car purchases in 1998 and 2003.

Financing Method	Est. 1992*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Cash plus personal loan	62%	58%	57%	55/60%	50/60%
Cash/other	27	24	21	20/25	18/25
Personal lease	11	18	22	15/20	20/25
Total	100%	100%	100%		

*Source: OSAT estimates from various sources. This was provided to the panelists as a baseline.

Selected edited comments

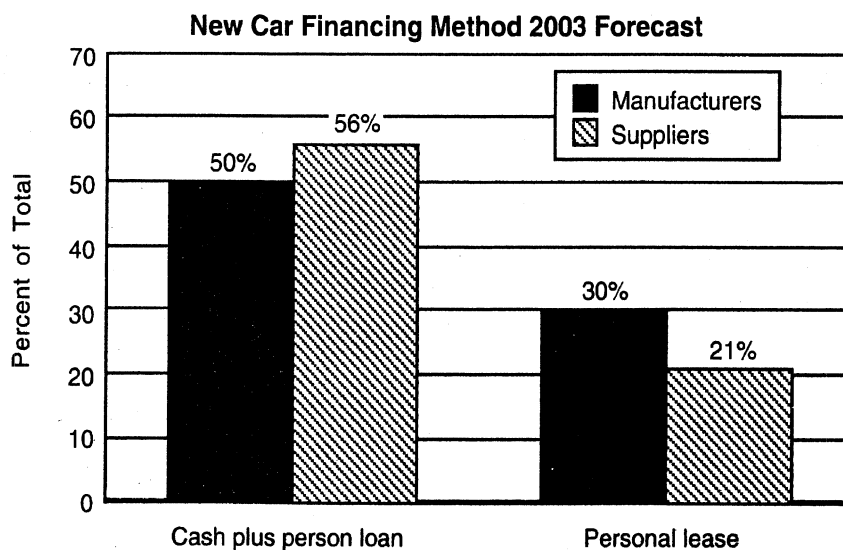
- Hopefully, personal savings will rise in this country.
- Increased tax burdens will preclude cash options for many.
- Manufacturers will promote leases to smooth out the durable goods cycle and increase customer recapture.
- People under 40 years of age do not share the seniors' and middle agers' value of debt-free ownership.
- Personal leases will continue to grow dramatically as the manufacturers push this approach to maintain affordability.

Discussion

Personal leasing is forecast to capture a full 22 percent of the 2003 new passenger car market. This is double the 1992 baseline estimate of 11 percent. Personal loans and cash and other categories are forecast to drop proportionately.

Manufacturer/supplier comparison

The manufacturers and suppliers are in substantial agreement on all forecasts except 2003 personal loan versus lease rates. The suppliers forecast 56 percent of 2003 passenger car financing will be supported by personal loans. Manufacturers forecast this amount to be 50 percent. Manufacturers foresee a larger market in 2003 for personal leases, forecasting this financing option at 30 percent versus the suppliers' forecast of 21 percent. Since the manufacturers are in greater control of this trend through promotions and captive financing arms, the magnitude of a shift towards leasing is most likely reflected in the manufacturers' forecast.



Trend from previous Delphi surveys

The current forecast reinforces the trend towards leasing. However, it is interesting to note that, in the middle of the great 1993 leasing wars, our panelists forecast lower future leasing levels than in the 1989 Delphi V and the 1992 Delphi VI studies. The 1989 Delphi V identified the increased interest in leasing, predicting 20 percent for 1995 and 27 percent in 2000. The 1992 Delphi VI panelists tempered this to 21 percent in 1995 and 25 percent in 2000.

Strategic considerations

The vehicle manufacturers are struggling to level off trade-in cycles by introducing financing packages which better reflect new vehicle prices, household income and family budgets. We deliberately mention incomes and budgets separately. Even if incomes do begin to rise again, families may choose not to increase the level of spending on new vehicles. While we believe that the forecast level of leases may be underestimated, the current forecast may indicate panelists' caution. This caution is understandable if a parallel comparison is made between the problems the manufacturers created before by managing capacity through commercial fleet sales and the potential problems of managing capacity through personal leasing today.

Efforts to push fleet sales flooded the market with near-new used vehicles, shifted profit from dealers' new vehicle to used vehicle departments, and drove dealer and manufacturer margins down. Most manufacturers have moved away from large commercial discounts. However, it is interesting that foreign manufacturers have begun to pursue this route to manage capacity (witness the number of foreign cars emerging in the U.S. rental car fleets). The Big Three heavily promoted personal leases through the 1993 and 1994 model years. The market is one to two years away from another glut of reasonably good used cars. This may account for panelists' expectations for leasing leveling off between 20 and 25 percent (the lower and upper quartile range). The comment regarding using leases as a method of smoothing out cycles is interesting. Perhaps if forecasting and scheduling in the industry could improve through more predictable trade in cycles, then these savings could justify the costs of leasing promotions and the necessity of the vehicle manufacturers to manage the used car side of the market.

MKT-16 What will be the source, in percent, of personal capital for financing retail passenger car purchases in 1998 and 2003?

Sources of Vehicle Financing	Est. 1991*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Commercial and savings & loans banks	44%	41%	39%	40/44%	35/44%
Manufacturer captive financial arms	32	35	37	32/35	34/40
Credit union	21	21	21	20/23	19/25
Other	3	3	3	3/5	3/5
Total	100%	100%	100%		

*Source: 1990 Buyers of New Cars, News Week, AAMA Facts and Figures 1992. This was provided to the panelists as a baseline.

Other responses include:

Credit cards—1998: 5 percent; 2003: 7 percent
Equity—1998: 6 percent; 2003: 10 percent

No comments

Discussion

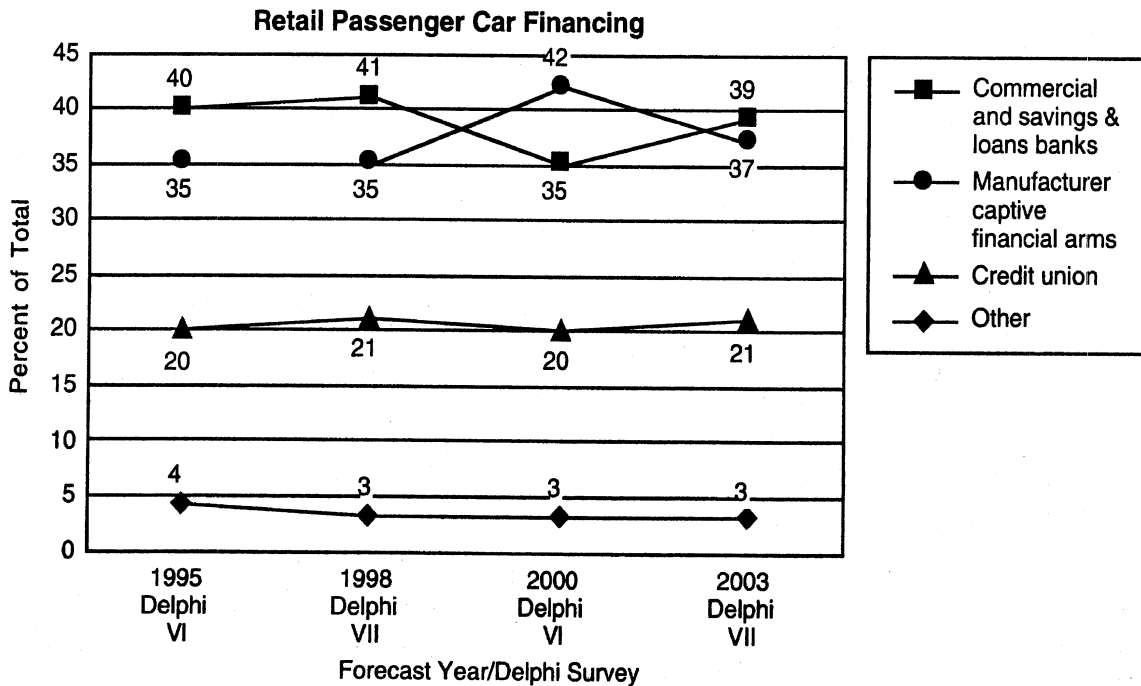
The sources of vehicle financing are not expected to change substantially from today. Commercial and savings and loan banking institutions and manufacturer captive financial arms will continue to dominate the vehicle financing market with more than a 76 percent share.

Manufacturer/supplier comparison

There is no substantial difference between the two panels.

Trend from previous Delphi surveys

The past two surveys reinforce the current trend of a tradeoff between banking institutions and manufacturer captive financial arm loans. However, the trend towards the manufacturers' captive financial arms has been tempered. The most significant trend reversal is the fact that manufacturers' captive arms are no longer expected to surpass the banking institutions' supply of automotive financing. As banking laws are liberalized, we may expect commercial and savings and loan banks to become more aggressive in matching interest rates and packaging savings, checking, mortgage and loan activities.



Strategic considerations

Automotive financing will continue to be dominated by banks, savings and loan institutions, and manufacturer captive financial arms. The continued expected growth of the captive financial operations over the past two Delphi studies has tapered off. This expectation may be from a variety of sources. First, while every car manufacturer wants increasing profits, the growth of most manufacturers' financial units has been significant, and balance between financial and vehicle operations is important. This trend may indicate that the financial units have met their objectives with regard to percentage of contribution to total income or profitability. Second, there has been some indication that non-traditional selling channels are emerging. These include vehicle brokers, motorist clubs and other national chains. If these services are more than just a short-term market fad, then banks, credit unions and other credit companies (such as GE Credit) have an opportunity to regain some market share.

MKT-17 Please estimate, in years, the average age of U.S. passenger cars and light trucks and the length of time new vehicle buyers will keep their vehicles in 1998 and 2003.

Vehicle Age and Ownership Trends	Est. 1992*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Average age of passenger cars	7.9 yrs.	8.2	8.5	8.0/8.5	8.1/9.0
Length of ownership by new car buyers	5.5	5.7	6.0	5.4/6.0	5.5/6.5
Average age of light trucks	8.1	8.5	8.5	8.2/9.0	8.2/9.5
Length of ownership by new light truck buyers	n/a	6.0	6.0	5.6/6.2	5.6/7.0

* Source: AAMA, *Facts and Figures*, 1992. This was provided to the panelists as a baseline.
n/a = not available.

No comments

Discussion

The average age and first time ownership of passenger cars and light trucks is expected to continue to rise some 5 to 10 percent over the next 10 years. From a base of 1992, the average age of the passenger car fleet is forecast to increase from 7.9 to 8.5 years by 2003. First time ownership may extend from 5.5 years to 6 years. The average age of the light truck fleet may increase from 8.1 years to 8.5 years. New truck ownership terms are expected to equal the passenger car's six year level by 2003.

Manufacturer/supplier comparison

There is no substantial difference between the two panels.

Trend from previous Delphi surveys

The trend continues of longer trade in cycles and increasing average age of the vehicles in the fleet. The current Delphi forecast reflects trend forecasts which were established by the 1989 Delphi V study. The fact that average age of light trucks is expected to level out (as is the average ownership time of new light truck buyers) reflects the expectation that sales of light trucks will continue to climb. With a continued substitution of light trucks for passenger cars, it is sensible that the average age of the passenger car fleet will continue to rise. The table below presents 1992 Delphi VI data.

Delphi VI	Median Response	
	1995	2000
Average age of passenger cars	8.0 yrs.	8.3 yrs.
Length of ownership by new car buyers	5.7	5.9
Average age of light trucks	8.0	8.4
Length of ownership by new light truck buyers	6.0	6.6

Strategic considerations

Moderate vehicle markets, consumer confidence, household incomes and other factors presented in previous questions all support the expected gradual increase in the length of new vehicle ownership and the overall age of the fleet. Like all market trends, one industry's threat is another's opportunity. These trends are not idealistic for new vehicle and original equipment parts manufacturers. However, retailers of extended service plans and manufacturers of replacement parts may see increasing market opportunities. Of course, these opportunities will be offset by the increasing reliability and durability of the new vehicle.

Manufacturers should attempt to moderate lengthening first time ownership trends. Baby boomers moving through and past their prime buying age while overall population growth is moderating. Manufacturers can increase sales production and income through two efforts: growing the market through increased turnover and capturing competitors' trade-ins. Yet, the cost of rebates, lease promotions and other efforts to increase turnover may be justified only to a point. In pure economic terms, that point is where the marginal cost of producing (and marketing) the unit is equal to its marginal revenue. Quantifying marginal revenue is easier than quantifying marginal cost.

There is a limit to how much manufacturers may change the market. Beyond a point, manufacturers, suppliers and dealers should restructure themselves to take advantage of the new reality. Managing product development costs and warranty claims are two important ways to minimize fixed costs (defined as a cost or activity required to match competition) and recurring costs (defined as a cost required to maintain customer loyalty once a product is manufactured and sold). Other actions, directed at controlling expanding markets (such as repair and service) and potential revenue streams (such as recycling and disposal), should be analyzed from a complete product profit life cycle viewpoint. Vertical integration has received a bad name over the last decade. We do not suggest attempting to own outright all the steps of providing vehicles and service. But we do recommend a systematic look at involvement considering ownership, equity investment, supply or demand control and other methods of securing markets, customers and profits.

MKT-18 From the perspective of the vehicle manufacturer, what will be the major bases of competitive differentiation within the franchised dealership and service channel through the year 1998? Please be specific, and consider the dealers' sales, service, and financing operations.

Competitive Differentiators	Percent of total responses
Service expertise—diagnostics, warranty support, and turnaround time	25%
Consumer relations—including transaction and on-going integrity and trust	23
Convenience—time and location	19
Financing assistance—value provided and time executed	10
Operating efficiency—providing overall value	6

Other responses include: sales knowledge (5 percent); dealer-installed accessories (4 percent); one-price no-negotiation (4 percent) delivery time (1 percent); dealer atmosphere (1 percent); dedicated dealerships (1 percent); and trade-in value (1 percent).

Selected edited responses

- Civilized sales help would be welcomed.
- Consumers need the opportunity for "no hassle" buying.
- Consumers require cost-effective repair and maintenance.
- Dealers must enhance the transaction experience.
- Integrity, trustworthiness and promises kept will be the methods consumers will judge dealers.
- Manufacturers should pursue a greater degree of dedicated, exclusive dealers.
- Sales persons need to be knowledgeable about the product being sold.
- There should be custom delivery of accessorized vehicles.

Discussion

After the sale, customer satisfaction will provide required competitive differentiation in the franchised dealership and service channels. Service expertise—specifically the ability to provide accurate diagnostics, warranty support and first time repair—is involved with 25 percent of all the responses to this question. The integrity and trust of the sales transaction and ongoing contact is the next most important characteristic. As customers' time become even more precious, convenience—place and time—becomes a significant differentiator.

Manufacturer/supplier comparison

These comparisons are not made for open-ended questions.

Trend from previous Delphi surveys

Delphi VII responses support trends established in the previous two surveys. The 1989 Delphi V identified the ability to fix a problem right the first time and in a timely manner as the most critical post-sale and service issue. The same study said the second most important service-related issue was the need to increase vehicle reliability and durability to restrict the need for service. The 1992 Delphi VI respondents included pricing in addition to overall service quality to provide the notion of value. Convenience (through additional hours and services) and customer handling (with communication and sensitivity) were identified in the top four post-sale issues. Delphi VII respondents agree with each of these competitive differentiators. They focused more towards specific service expertise, clearly identifying one resource required to ensure fixing a problem right the first time.

Strategic considerations

Service expertise, consumer relations and convenience—these qualities continue to be identified as the top dealer differentiators. Dealers and manufacturers continue to create programs to address these issues, but many would argue the level of achievement. We find it interesting that many cost reduction and quality improvement efforts implemented by the vehicle manufacturers are delayed in application at the dealership level. Just-in-time production methods have not influenced the level of inventories on dealers' lots. Has statistical process control been used to truly reduce billing errors, service wait time and other service-related measures? Has total quality management been implemented such that the used car, new car, service and financial operations are all promoting customer satisfaction in a synergistic manner, rather than each working towards its own profit objectives? Has benchmarking, the rage of the vehicle manufacturers and suppliers, enlightened dealership management as to what customers are experiencing in other consumer industries?

Certainly there are many very capable, diligent and committed dealers. But consumer expectations are being raised by nonautomotive manufacturers. General Electric operates a 24-hour hot-line to answer trouble-shooting and operational questions. Federal Express offers software with which users, through a modem, can track the progress or acceptance of a package. Xerox personal copiers come with a three-year warranty that includes contracts with local shipping companies to expedite shipping and a follow-up phone call within 48 hours to inform the customer of receipt, service technician name, initial diagnosis and expected delivery date. These commitments place pressure on a company to ensure well-informed operators, fail-safe information systems, and well-trained and staffed service centers. The vehicle manufacturers are responding with toll-free numbers, loaner vehicles and other customer services. These are just a few examples. Hotels, computer software mail order houses, and others offer a wide range of activities that dealers and manufacturers might consider adapting to promote, as the one panelist notes, integrity, trustworthiness and promises kept.

MKT-19 Numerous characteristics describe the U.S. dealership network. Please indicate your 1994-2003 trend forecast for each of the following characteristics (where 1 = sharply increase, 3 = no change, and 5 = sharply decrease).

1994-2003 Dealer Trend	Mean Rating
Number of "mega-dealers" (chain ownership)	1.7
Number of dual franchise dealerships	1.9
Number of vehicles sold per dealership outlets	2.0
Percentage of financial, insurance and extended warranty sales to overall dealership gross sales	2.5
Dealership return on assets	2.8
Average import nameplate inventory levels	3.1
Average domestic nameplate inventory levels	3.5
Number of new car dealerships	3.9

Selected edited comments

- Currently there is an excess of dealerships, and dealer profit margins are thin. Consequently, consolidation will result by dealers picking up multiple lines to stay in the market.

Discussion

While panelists believe the number of new car dealerships will decrease over the next 10 years, the surviving dealerships may experience increasing number of vehicles sold per dealership and return on assets. Domestic manufacturer inventory levels may decline, while import inventories are expected to remain unchanged.

Manufacturer/supplier comparison

There is no substantial differences between the two panels.

Trend from previous Delphi surveys

There are several changes from the earlier studies. The 1992 Delphi VI panelists believed that the reduction of new car dealerships would level off through the year 2000. Because of continued overall weak markets and the failure of certain manufacturer divisions to recover, our panelists are once again predicting decreasing numbers of dealer outlets. Along with this change, Delphi VII panelists, while agreeing with the past predicted trend, see a stronger increase in the number of mega-dealers and dual franchises.

Strategic considerations

Trends identifying dealership characteristics have been well established over the last six years. It is logical that the dealers are consolidating to face the constraints of a mature marketplace, regional geographic growth patterns and rising costs of marketing and product service support. Certainly, economies of scale may be achieved through likely consolidations such as insurance, advertising, accounting, part inventories and others.

In addition, consolidation offers more sophisticated savings opportunities. These include the management of used cars through national auctions (providing a national rather than local market for trades taken in and a source for local used car markets), transfer of sales personnel across wider sales opportunities (reducing hiring costs and increasing individual productivity), and the ability to participate in large fleet order bids (providing income to reinvest in other parts of the business).

While a strong and profitable dealer body is advantageous to the vehicle manufacturer, the manufacturer must judge this growth of concentrated assets and buying power against its traditional methods of control. Perhaps lessons from the customer-supplier relationship might apply here. Both organizations, the dealers and the manufacturers, have different business agendas. An increase in dealers' profits might come from a reduction in the manufacturers' price, or the growth of a mega-dealer might come at the cost of reduced manufacturer loyalty.

Both organizations also have many shared agendas: building customer loyalty, supporting service technology investment and increasing marketing exposure. It is through these shared objectives that increased mutual dependency may be built. The other issues tend to take care of themselves if the business is growing and mutual respect is paid to the business agendas which may be in conflict. If dealer-factory relations evolve similar to customer-supplier relations, dealer power and sales influence may increase.

MKT-20 Please forecast the change in share of service activity for each of the following outlets over the next ten years (1994-2003). Please indicate your response where 1 = sharply increase, 3 = no change, and 5 = sharply decrease.

Service Trends by Type of Outlet	Mean Rating
Franchised auto specialists (Goodyear, Precision Tune)	2.3
New car/truck dealers	2.6
Fleet operator shops	2.6
Mass merchandisers (Sears)	3.2
Independent repair shops	3.4
Service stations	4.0

Selected edited comments

- Only those with the resources for continued training will be capable of repairing the advanced technologies being built into vehicles.

Discussion

The marketing panel foresees a continued decline of service station repair volume, while franchised, independent repair shops will see an uptick in their business. The panel also sees growth in service activities among new car and truck dealerships and fleet operator shops.

Manufacturer/Supplier Comparison

There is no substantial differences between the two panels.

Trend from previous Delphi surveys

The trends identified by this year's panel confirms the trends identified in the last two surveys. We added mass merchandisers and franchised auto specialists to this year's survey. The franchised auto specialist and the new vehicle dealer are expected to pick up the most share (the 1989 Delphi VI rated this 2.5). There is an even greater belief that service station activity and independent repair shops will decline (the 1992 Delphi VI rated these two outlets 3.8 and 3.1, respectively).

Strategic considerations

The manufacturers have a difficult issue to face. While the manufacturers have significant input into the new vehicle franchises (through direct investment, training, and documentation), they have very little influence over the franchised auto repair specialists. Franchised specialists have economies of scale that allow diagnostic tool, training and other support investment. The franchised specialists are in a position to pick up business from the mass merchandisers as retailers such as Sears reduce the number of services performed, and growing merchandisers such as Wal-Mart push parts though—at least to date—little service.

Service may be done by a non-dealer independent repair franchise, but the vehicle still carries the manufacturer's brand. Which one will get the blame if the service is not satisfactory? There are many opportunities open to manufacturers in this area. Programs to market aftermarket parts through these franchises is the most obvious. But opportunities are also available to provide training, diagnostic equipment and service information on CD-ROM. In the past, the franchised auto dealers have protested against these forms of support. However, it is time to realize that 1) future new vehicle customers need to be in very skilled hands wherever they go for service, and, 2) if the vehicle manufacturer is not the one to provide this type of support (either directly or indirectly through contracted services), some other entrepreneur will.

MKT-21 The value of true total customer satisfaction is difficult to quantify. For the given segments, please identify the average incremental price a customer is willing to spend to achieve increases in the following typical quality measures.

Quality Measure	Median Response				Interquartile Range			
	Entry Level	Intermediate Family	Luxury	Sport Utility/ Compact Van	Entry Level	Intermediate Family	Luxury	Sport Utility/ Compact Van
From 2 initial quality defects to 1 defect	\$0	\$75	\$100	\$100	\$0/100	\$0/250	\$0/500	\$0/300
Reducing scheduled maintenance from every 7,500 miles to 10,000 miles	50	100	75	100	0/200	0/200	0/250	10/200
Reducing non-scheduled service operations in half	100	125	200	200	0/200	0/200	0/500	0/250

Selected edited comments

- How can the consumer obtain this information? Regarding "reducing non-scheduled service operations in half," the closest source of information might be *Consumer Reports*.
- Most luxury cars now have reduced maintenance and scheduled service.
- Service and convenience enhancements may be an option.
- Regarding maintenance, the seller must differentiate in the consumer's mind, not his or her pocketbook. Few consumers will invest or pay more now for a return later.
- The conscientious owner schedules maintenance at less than 7,500 miles and those who are not concerned about maintenance will ignore 10,000 miles as easily as they now ignore 7,500 miles.
- These are the things that will have to be done to remain competitive. Besides, to earn incremental money up front, buyers will have to believe the quality claims.
- 1) Quality Defects—a) I do not want any and I do not expect to pay extra. b) It depends on defect (e.g., paint defect versus electrical system problem). 2) Service—I am going to change oil every 3,000 miles regardless, and I am not too sure that reducing scheduled maintenance is a good thing. 3) Non-scheduled service: What is that? If it means breakdowns, I do not want any and I do not expect to pay extra.

Other single responses:	Entry level	Intermediate/ Family	Luxury	Sport Utility/ Compact Van
"Feel" of switches, gauges, seats, etc.	\$250	\$500	\$2,500	\$500
Fit and finish	100	250	1,000	300
Bumper to bumper, all parts extended warranty	500	800	1,000	1,000
Life of car (initial owner), all parts warranty	900	1,200	1,800	1,800
Fit, finish and paint perfection	100	300	600	100
Better fit and finish	15	20	50	15

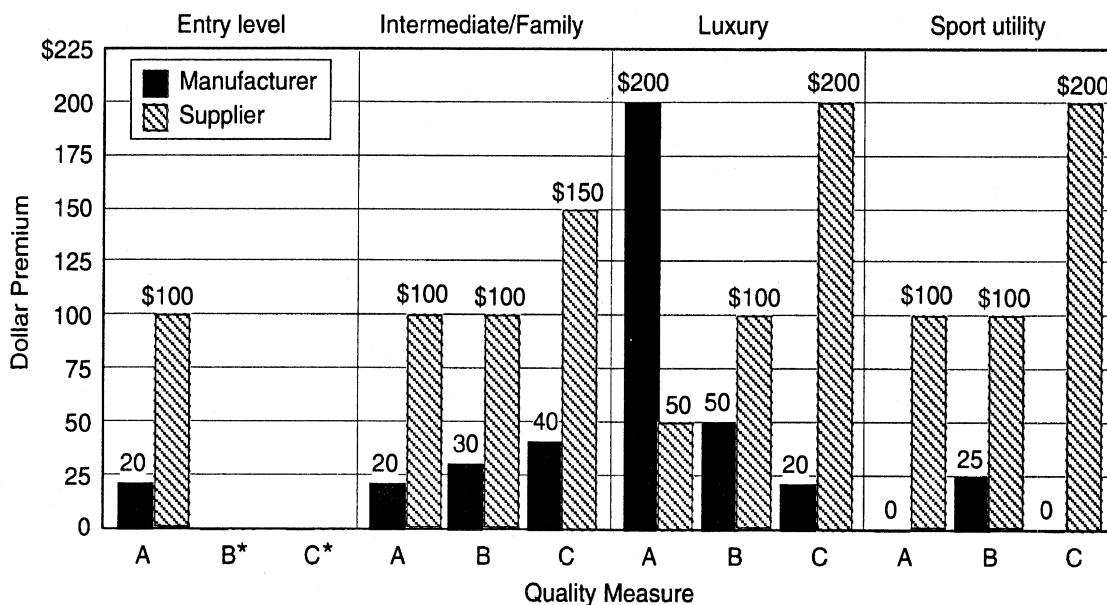
Discussion

The comments support the conclusion that customers do not want to incur any additional costs for increased quality or reduced service time. The numerical responses indicate there may be additional value—and revenue—in this area. Reducing non-scheduled maintenance requirements is perceived most valuable to entry level, intermediate family, luxury and sport utility/compact van buyers. It is perceived that luxury and sport utility/compact van buyers, in general, value quality improvements more so than entry level and intermediate and family buyers. This conclusion is most likely tied to the price differences between the vehicle classes and owners' time pressures.

Manufacturer/supplier comparison

The figure below presents the wide answer variation between manufacturers and suppliers. Except for one case, the suppliers believe customers will pay significantly more for a variety of quality improvements. The single exception is in the luxury car class where the manufacturers believe there is enough price latitude and quality emphasis to warrant a \$200 increase in price to lay claim to only one defect per vehicle. While the true answers to this question are difficult to find, these differences in perception are important. It shows that communication is required between the supplier and manufacturer on customer quality values. As this question indicates, the two groups could work under a different set of priorities given their perception of customer value.

Customer Value of Quality Improvements by Vehicle Segment



- A = From 2 initial quality defects to 1 defect
- B = Reducing scheduled maintenance from every 7,500 miles to 10,000 miles
- C = Reducing non-scheduled service operations in half
- * No substantial difference

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

We did not expect to receive definitive answers to this question. Because of its subjectivity, our intent was to illicit interesting responses and general thought trends. It is obvious that our respondents believe that the qualities of these attributes must be provided in the base price of the vehicle. The zero dollar lower quartile range and the comments tell us this is true. It is, however, interesting to note that the panelists equate the luxury segment and the sport utility/compact van market together in terms of quality requirements. It is also interesting to note that our panelists believe that reducing non-scheduled service operations by half holds approximately twice the consumer value as reducing initial quality defects.

These results should not be interpreted literally. That is, a manufacturer cannot drop a vehicle's price by \$75 and automatically equate a vehicle with two defects with a vehicle with only one. If the second defect involves missing a day of work, the \$75 price differential is eaten up in a hurry. In short, a price advantage is not necessarily a competitive advantage if the customer believes another vehicle demands a price premium.

We understand the comments indicating that the customers expect these attributes. Nonetheless, everything that evolves into an automobile is a compromise in some way, shape or form. This question raises these issues: How important is initial quality compared long-term durability? What are the marginal benefits to extending service intervals? How important is dependability to an entry level buyer who might only have one vehicle versus a luxury car owner who might have three or four vehicles available? These are hard questions that, to remain customer-driven, need continuing consideration.

MKT-22 For the year 1998, please select from the following list the five most important considerations you believe will influence the desire to purchase an electric passenger car for personal use. Please do not attempt to rank these attributes; simply check the five characteristics you believe are the most important initial considerations.

Electric Vehicle Attributes	Percent of total respondents
Driving range	100%
Purchase price	100
Operating cost	76
Vehicle performance	51
Service availability	49
Tax/other government incentives	41
Status/environment appeal	27
Product quality	22
Safety	19
Passenger/cargo space	19

Others receiving mention: product technology (16 percent), infrastructure/recharging availability (11 percent), dealer/company incentives (8 percent), exterior styling (8 percent), vehicle ride characteristics (5 percent), value for the money (3 percent).

Selected edited comments

- Most people who will consider purchasing an electric vehicle will not want to pay more in price or operating cost versus a gasoline vehicle.
- Recharging availability is key. Who wants to get stuck because of a miscalculated battery charge or extended air conditioner use?
- We see electric passenger cars as a commute vehicle for "greenies" rather than for mainstream buyers.

Discussion

Electric vehicles will sell for personal use with the right combination of driving range, purchase price, operating cost, vehicle performance and service availability. These attributes are similar to those factors driving demand for internal combustion engine (ICE) vehicles. However, ICE competition, for the most part, is between one nameplate and another. Electric vehicles must compete with each other and with ICE vehicles.

Manufacturer/supplier comparison

Aside from one exception, the same attributes find their way into both panels' top five list. The suppliers include operating costs in their top five, while the vehicle manufacturers list status and environmental appeal in their top five.

Trends from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

As one electrical vehicle engineer stated in a speech, "Putting the electric vehicle out on the road is a complete leap of faith." Despite raised laughter from the audience, the 1998 California requirements for EVs are around the corner. A vehicle using all-new propulsion technology, requiring changes in usage patterns and creating whole new market segments has no marketing or consumer acceptance history (not including the electric vehicles of the early 1900s).

Two major top five considerations stand out: driving range and purchase price. The other top three considerations—operating cost, vehicle performance and service availability—are nearly the exact attributes listed for current entry level vehicles (MKT-10a). Test fleets are being made available to gather consumer research. However, it still remains a mystery what will actually motivate individual consumers to purchase these new vehicles. The cost to produce EVs in low volumes may be extremely high. This will distort the price-to-value ratio for early adopters.

Demand for EVs must come from a broader constituency than "greenies." Yet the market is a difficult one to develop, because, as it appears in this question, it requires the right vehicle (driving range), infrastructure (service availability), incentives (tax or otherwise) and marketing (status/environmental appeal). These factors cover the initial purchase and operation over the life of the vehicle.

MKT-23 Do you believe a customer will exclude a vehicle from consideration if it does not provide the following benefits, or be willing to pay a reasonable premium (for example, \$200 on a \$20,000 vehicle) to obtain each of the following material-related benefits?

Material Advantage	Percent of Total Respondents			
	Exclude from purchase consideration		Pay a \$200 premium	
	Yes	No	Yes	No
Lifetime corrosion protection	39%	61%	53%	47%
Ease of repair	21	79	31	69
Perceived enhanced crash protection	60	40	73	27
Ding-resistance	28	72	46	54

Other single responses include: Environmental friendliness: Exclude from purchase consideration: No; Pay a \$200 premium: Yes.

Selected edited comments

- People will pay for enhanced safety. The other characteristics are a given.
- This question is difficult to answer. What do you mean by "lifetime" and "ease of repair?" Perhaps the opposites need to be explored: difficulty of repair, poor crash protection, etc.

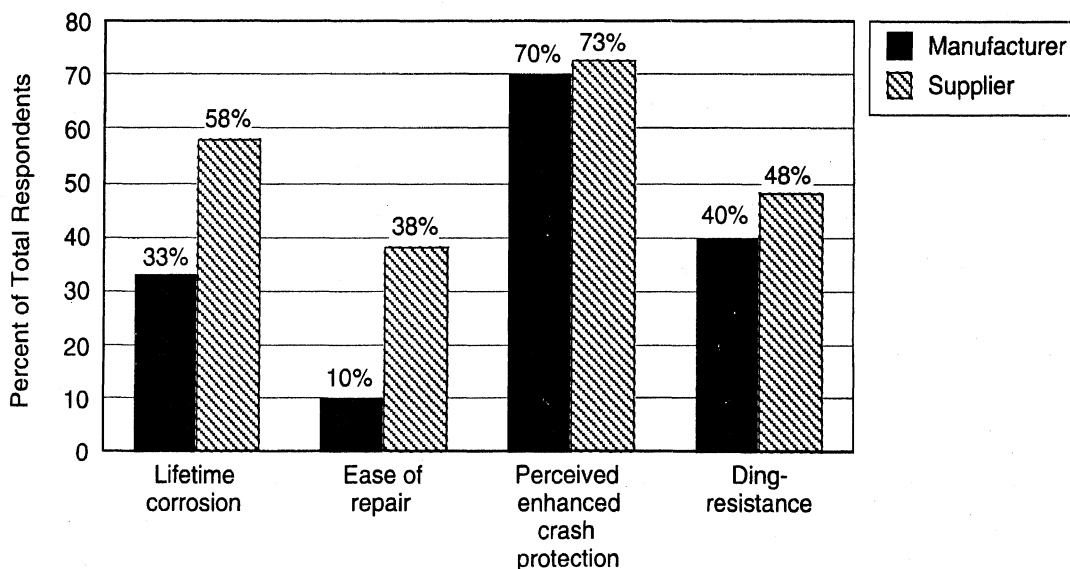
Discussion

Material selection involves many assumptions regarding customer valuation. The marketing panel believes that only enhanced crash protection carries the significance of possible vehicle exclusion from a customer's consideration if a material does not deliver. The panelists project that customers may be willing to pay a \$200 premium for material usage that delivers lifetime corrosion protection and enhanced crash protection.

Manufacturer/supplier comparison

There is only one difference of opinion between the manufacturers and suppliers regarding whether or not customers will exclude a vehicle given the lack of a material performance. Sixty-seven percent of the manufacturer respondents believe that customers will exclude from purchase a vehicle that does not provide perceived enhanced crash protection. Fifty-eight percent of the suppliers believe this is the case. Similar to MKT-21, the suppliers believe that the customer will pay a premium for a wide variety of attributes. The following figure presents these differences. Only in the case of crash protection do the manufacturers believe the customer will pay a premium. In all other cases, manufacturers believe the attributes will not carry enough additional perceived value to warrant a premium price.

Panelists Believing Customers Will Incur a \$200 Premium for Material Qualities



Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

Except for perceived enhanced crash protection, the panelists do not believe that the given material characteristics are able to move a customer to exclude a vehicle from consideration. Lifetime corrosion and ding-resistance protection are, however, two attributes that may provide product differentiation while attracting a price premium. These attributes may also provide additional trade in value. Given this perceived interest, vehicle manufacturers and suppliers have potential vehicle marketing and material market opportunities, respectively.

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MKT-24 Industry consolidation occurs in a number of ways. Companies may exit the auto industry in certain regions (e.g., Peugeot in the United States). Other firms may continue to market vehicles while under the ownership of another firm (e.g., Jaguar). Still other firms may limit the number of individual nameplates receiving engineering and marketing support. Please indicate the trend of these three rationalization processes (where 1 = sharply increase, 3 = no change, and 5 = sharply decrease) through the year 2003.

Industry Consolidation	Mean Rating
Number of <u>nameplate offerings</u> in the U.S.	3.4
Number of <u>companies marketing</u> vehicles in the U.S.	3.5
Number of <u>independent companies</u> worldwide	3.9

Selected edited comments

- As countries emerge from "third world" status, the automotive industry will become more competitive. The auto industry, with all its infrastructure required, is an excellent industry to help a country's economy grow. I foresee this situation for at least 50 years, particularly in South America, Africa and others.
- I believe, especially in Europe, that consolidation will take place. Only competitive firms will survive. The recent past has shown several foreign manufacturers pulling out of U.S. market. I believe this trend will continue. Overall, there is excess worldwide vehicle production capacity.

Discussion

The panel projects a continued decrease in the number of independent companies operating worldwide. The number of companies marketing vehicles in the United States will decrease as well. However, the panelists do not rate this declining trend as strongly as their view of the number of world competitors. The number of nameplates marketed in the United States is also expected to decline.

Manufacturer/supplier comparison

There is no substantial difference between the two panels.

Trend from previous Delphi surveys

The 1992 Delphi VI asked a variation of this question. Panelists believed that there was going to be a consolidation of worldwide companies through financial combinations (a 2.3 on a 5 point scale, where 1 = highly agree and 5 = highly disagree). The panelists also believed that there would also be rationalization by failure (2.2 on the 5 point scale).

Strategic considerations

Over capacity, capital investment, global presence, technology innovation and others are forcing a consolidation of the international manufacturers. While still producing vehicles, smaller companies such as Saab and Jaguar have already lost their independence—relying on larger firms for capital, technology, product development and components. However, the failure of the formal combination of Renault and Volvo in 1993 indicates the difficulty of larger joint ventures, mergers and acquisitions. The manufacturers will increasingly need to balance brand awareness and corporate identity with economies of scale.

The United States has already witnessed a rationalization of firms participating in its borders. Diahatsu, Sterling and Peugeot have all retreated. New entrants, such as Kia, may be long-shots to succeed. Increasing regulatory burden, Big Three consortia resources, and population geographic variances make success for small companies in the U.S. market much more difficult. It also makes firms, or groups of firms, much more intense in terms of the willingness to compete. Regional trading blocks, such as the one created by the North American Free Trade Agreement, may significantly alter the competitive balance known today. Companies should be judged not by what resources (technical, financial, and others) they own, but what resources they have access to. If virtual firms truly emerge, competitive analysis will be forced into real time analysis.

MKT-25 In the 1992 model year, there were 24 passenger car nameplates that were produced with fewer than 50,000 units. Please forecast if this number will increase, decrease or remain the same in 1998. Where 1 = greatly increase: 5 or more over 1992, 2 = somewhat increase: 2 to 4 over 1992, 3 = no change: 1 more or 1 fewer, 4 = somewhat decrease: 2 to 4 over 1992, and 5 = greatly decrease: 5 or more fewer.

Mean Forecast
3.6

Selected edited comments

- Differentiation will remain important. However, cost reduction efforts will require the consolidation of platforms.
- Even the Japanese are having cost problems in the face of niche proliferation. The trend is reversing.
- If electric vehicles are successful, small volume production will greatly increase.
- Some vehicles are now no more than financially-supported hobbies.
- The auto industry needs to improve economy of scale and profits.
- The investment required to manufacture these vehicle volumes will be harder to justify.
- The segmentation of the market will continue and, if anything, increase.
- There will be no significant changes by 1998. Some decrease will possibly occur after 2000.
- There will be cost consolidation. Manufacturing and marketing will focus on the brand.

Discussion

The panelists believe that two to four nameplates with production volumes under 50,000 units may be eliminated from the U.S. market. This forecast is a net change: electric vehicles and vehicle division differentiation efforts may require additional niche vehicles.

Manufacturer/supplier comparison

There is no substantial difference between the two panels.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

The mixed response we received from this question indicates the level of uncertainty facing tomorrow's product planner. For all the discussion about human and financial resource constraints, rising costs of business and others, the panelists only managed to rate this statement a 3.6—a slight decrease in the number of niche nameplates. Most plans are locked in for 1998, so any changes will probably occur beyond this forecast year. On the other hand, pressures to reduce costs, efforts to leverage economies of scale and strategies to reallocate capital resources will certainly raise the investment hurdle rate. While the comments indicate that niche markets will be declining rapidly, the overall rating indicates only a slight decrease. Perhaps the limited change forecast occurs because there are many off-setting product plan influences and individual company situations.

There are several pressures working against a reduction in the number of niche vehicles. Cost reduction efforts may consolidate platforms and additional savings may be directed at marketing low volume vehicles. Electric vehicles are a brand new segment that may offer coupes and sedans at low volumes. Also, the increasing number of manufacturers marketing common light-truck models (such as that Isuzu-produced Honda passport) indicates a potential increase in the number of niche models.

According to many reports, the new vehicle development process is 42 to 54 months in the United States and Japanese producers' development cycle is significantly shorter.

MKT-26a Please give your forecast (in months) of future development cycles, from concept approval through production of first marketable vehicle, for the hypothetical reskinning of platforms that maintain current hardpoints.

Future Development Cycles Maintaining Current Hardpoints	Median Response			Interquartile Range		
	Current Est.	1998	2003	Current Est.	1998	2003
U.S. manufacturers	42	36	32	36/48	30/40	24/36
Japanese manufacturers	34	30	28	30/38	34/36	24/32

No comments

Discussion

The panel estimates that the current product development time for reskinning a vehicle is 42 months for the U.S. manufacturers and 34 months for the Japanese. Through 2003, the panel forecasts that the Japanese will maintain a shrinking lead. The U.S. manufacturers will likely be able to reskin a product in 32 months and the Japanese in 28 months in the year 2003.

Manufacturer/supplier comparison

The vehicle manufacturers and suppliers are within 10 percent of each other's forecasts for reskinning product development timing except for both 2003 forecasts. The vehicle manufacturers project U.S. manufacturers at 36-month product development cycles in 2003, and suppliers forecast a strong 30-month cycle. Considering the Japanese, vehicle manufacturers forecast a 30-month 2003 product development cycle. The suppliers project a 26-month Japanese cycle in 2003. It is interesting that the manufacturers are more pessimistic regarding their own ability to bring product to market. The higher estimates might be more accurate since it is the manufacturers, for the most part, that control the organizational and other elements of the product development process.

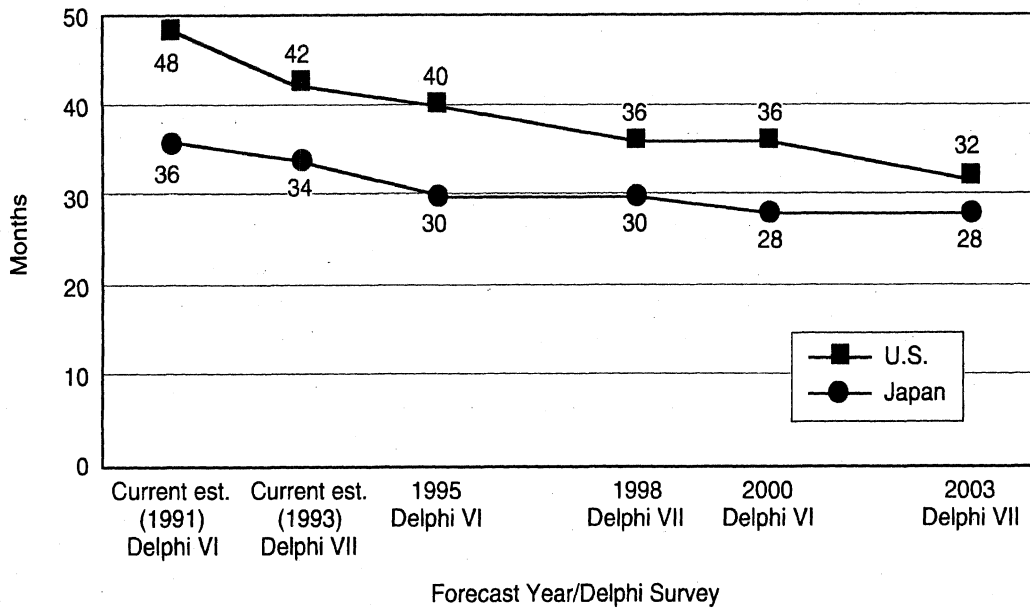
Comparison of forecast: TECH-31

For high volume vehicles, technology panelists forecast 2-3 months longer cycle time for all years for U.S. and Japanese manufacturers.

Trend from previous Delphi surveys

This question is slightly different than in years past. The Marketing panel did not differentiate between high volume (defined as greater than 50,000 units per year) and low volume. For the sake of comparison, the current average estimate of 42 months for U.S. manufacturers is down from 48 months in the 1992 survey (please see the figure below). The Japanese were estimated at 36 months in 1992 and the current estimate has dropped to 34 months. The Delphi VII U.S. manufacturer forecast fits the trend established by the 1992 Delphi VI: 40 months (1992 Delphi VI, 1995), 36 months (Delphi VII, 1998), 36 months (2000), and 32 months (Delphi VII, 2003). The 1992 Delphi VI Japanese trend is also reinforced by this Delphi's results: 30 months (1992 Delphi VI, 1995), 30 months (Delphi VII, 1998), 28 months (2000), and 28 months (Delphi VII, 2003).

Product Development Cycles — Platform Reskin



Strategic considerations
Please see (MKT-26b.)

MKT-26b Please give your forecast, in months, of future development cycles, from concept approval through production of first marketable vehicle, for a hypothetical new platform that establishes new hardpoints.

Future Development Cycles Establishing New Hardpoints	Median Response			Interquartile Range		
	Current Est.	1998	2003	Current Est.	1998	2003
U.S. manufacturers	48	42	36	45/54	39/48	35/42
Japanese manufacturers	40	36	34	36/48	33/42	30/37

No comments

Discussion

The panel believes new platform product development cycles will converge between the U.S. manufacturers and the Japanese. The estimated eight-month development cycle advantage of the Japanese (48 months versus 40 months) is forecast to virtually disappear by 2003. Our panelists predict U.S. manufacturers will improve their cycle time by six months every five years to achieve 36 month cycles by 2003. The Japanese may improve, as well, but by only six months to 34 months in 2003.

Manufacturer/supplier comparison

There is no substantial difference between the two panels.

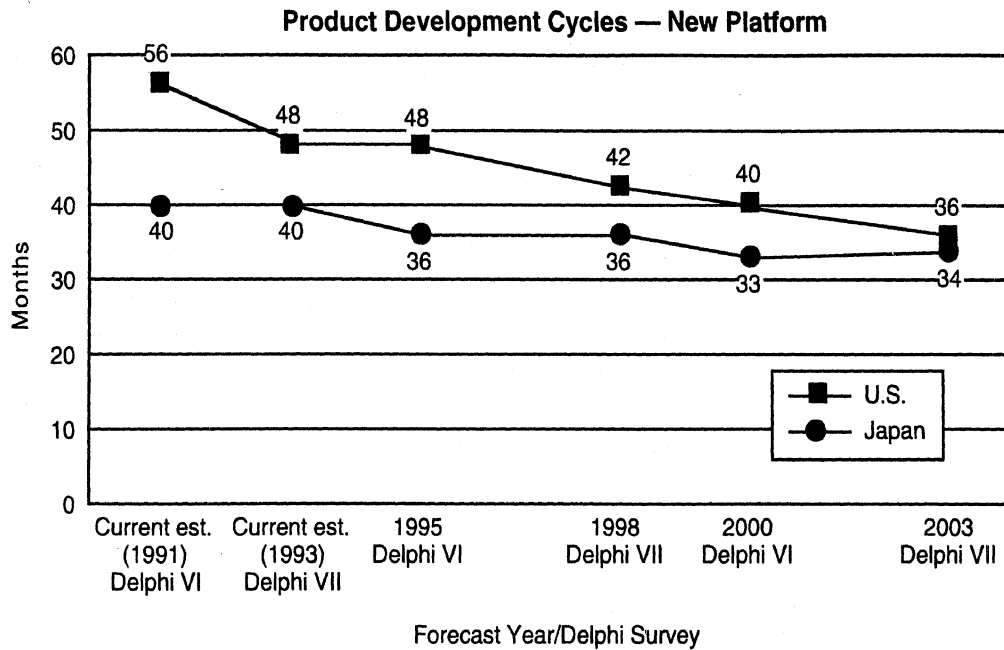
Comparison of forecast: TECH-32

Technology and marketing panelists were in agreement for cycle time in Japan for high volume vehicles. Results for U.S. manufacturers were somewhat different. These differences are summarized in the table below. The difference may be attributable to the fact that marketing is responsible for a large portion of the program preceding approval of the clay model, but engineering and manufacturing are largely responsible for the program following this point. It is sometimes difficult to assess how long it takes someone else to do their job, and there may be a general tendency to err on the low side. Variation may be a result of differences between companies and/or normal statistical variance of the estimate. Another possible factor may be the general disagreement within the industry regarding when the clock starts.

Future Development Cycles U. S. High-Volume Vehicle Establishing New Hardpoints	Median Response		
	Current Est.	1998	2003
Marketing panelists	48	42	36
Technology panelists	52	44	38

Trend from previous Delphi surveys

Similar to MKT-26a, we will compare this study's results to the question in years past referring to high volume product development programs. The current estimate for U.S. manufacturers has fallen eight months from 56 months to 48 months (please see the figure below). The Japanese current estimate (1992 for the 1992 Delphi VI) remains the same at 40 months. The Delphi VII U.S. manufacturer forecast fits the trend established by the 1992 Delphi VI: 48 months (1992 Delphi VI, 1995), 42 months (Delphi VII, 1998), 40 months (2000), and 36 months (Delphi VII, 2003). The 1992 Delphi VI Japanese trend is also reinforced by this Delphi's results: 36 months (1992 Delphi VI, 1995), 36 months (Delphi VII, 1998), 33 months (2000), and 34 months (Delphi VII, 2003).



Strategic considerations

The U.S. manufacturers continue to reduce the difference of product development time between themselves and the Japanese. Today's eight-month margin of difference (essentially a whole model year) in reskinning and new platforms is forecast to reduce to four months and two months, respectively by 2003. At this point, the timing of the model launch becomes less of a competitive issue—a strong long-lead press offensive has the potential to capture a prospective buyer's interest and hold it until the product is formally introduced. While timing diminishes in importance, hitting the target market and minimizing product development (including tooling investment) costs becomes critical. Matching a competitor's introduction dates with poor product or large financial amortization commitments will stall a product launch.

Development time has been reduced dramatically over the past ten years. However, costs seem to have escalated, and we wonder if the domestic car companies are focused on instilling strong linkages to the market, internal information dissemination mechanisms and product development discipline. Chrysler has had a string of product success—measured by product market appeal, development costs and product development time. This series of hits replicates the string that Ford Motor developed in the mid-1980s. The Japanese manufacturers are facing a great deal of stress as they internationalize their product development activities. Juggling more platforms, suppliers and engineering centers will test the strength of their current product development systems and, to remain competitive, force their evolution to new systems and techniques. Benchmarks of product development success will change as new systems are implemented, role of supplier evolve, industry standards are developed and partnerships are formed.

MKT-27 What organizational, technological and/or business environment changes need to occur to realize your forecast in MKT-26 for U.S. design cycles?

Changes Required	Percent of Total Responses
Organization—including cross-functional team structures and downsizing	22%
Supply base integration—including co-located teams	19
Engineering and design process discipline	10
Part, material, and product rationalization	9
Flexible manufacturing processes	7
CAD/CAM integration	7

Other responses include: capital (6 percent); improved customer understanding by companies (6 percent); simulation (3 percent); cross-functional education (3 percent); better consortia usage (3 percent); space-frame construction (3 percent); low cost tooling (1 percent) and target pricing (1 percent).

Selected edited comments

- Equal education and training of manufacturing and product engineers is needed.
- Management “contract” or commitment is required.
- Manufacturers and suppliers need to pursue “design-in” product development for earlier supplier involvement.
- Material specification and part consolidation will allow speedier product development.
- Meeting shorter product development goals requires simultaneous prove-out of design and manufacturing process through a disciplined prototype process.
- Personal performance reviews need to be based on teamwork and shared objectives.
- These goals require team play by all disciplines, functions and organizations.

Discussion

Human resources and business processes are the two key areas in which U.S. companies must concentrate to achieve a reduction in product development times. Organizational issues are the panels’ first concern with 22 percent total responses. Leveraging the supply base (19 percent of the total responses) reinforces the right internal organizational structure and incentives. Both of these elements must be brought together and guided by a strong engineering and design process discipline (10 percent of total responses).

Manufacturer/supplier comparison

These comparisons are not made for open-ended questions.

Trend from previous Delphi surveys

Very similar issues appear in the 1989 Delphi V’s, the 1992 Delphi VI’s and the current Delphi VII’s top five necessary changes to achieve improving product development standards. Increasing use of product development teams, reducing bureaucracy, increasing supplier integration, increasing computerization and improving product definition were the key issues identified by 1992 Delphi VI panelists. Delphi VII panelists expand the list to include streamlined product planning and manufacturing. The more recent surveys focus on organizational issues. The 1989 Delphi V, while identifying improved project management as the most critical item, rated increased CAD/CAM usage as second and part commonality as fifth.

Strategic considerations

Processes, leadership and relationships stand as the key (or barrier, if you wish) to product development improvement. After the CAD/CAM, digital signal transmission and other hardware is installed, it still comes down to the processes that transform ideas to job one, leadership that motivates people to action, and relationships that links individual resources to program requirements.

While all this may be obvious, the obvious is often the most difficult to implement. CAD/CAM equipment can be bought with cash. Processes, leadership and relationships require a change in behavior. The comment regarding the need to link personal performance reviews with teamwork objectives is especially pertinent here. Changes in behavior occur only if there is the proper reward—in promotion, salary or bonus—and supporting environment—in team work, recognition and contribution. Vehicle manufacturers and suppliers must change their hiring, compensation and promotion strategies to initiate and support the change process.

MKT-28 What is the maximum time, in months, allowable between minor facelifts and new platforms for various segments in order for a vehicle to remain competitive?

Segment	Median Response (in months)				Interquartile Range (in months)			
	1998	1998	2003	2003	1998	1998	2003	2003
	Facelift	New platform	Facelift	New platform	Facelift	New platform	Facelift	New platform
Passenger Car								
Entry level	36	60	36	60	36/36	60/60	36/36	55/60
Intermediate/ family	36	60	34	60	36/36	60/60	30/36	54/60
Luxury	36	56	30	50	36/36	54/60	30/36	48/60
Light Truck								
Compact van	36	72	36	72	36/36	60/72	36/36	60/72
Sport utility	36	72	36	68	36/40	60/72	36/36	60/72
Pickup	48	90	42	84	48/48	72/96	40/48	72/90

Selected edited comments

- Specialty cars require 24 months between facelifts and new platforms every eight years with minor facelifts occurring in years two and six and a major facelift in year four.
- Time to market, I believe, is the only advantage open to all the OEMs. Quality, price, and styling are all so similar that the first to market will be the big winner.

Discussion

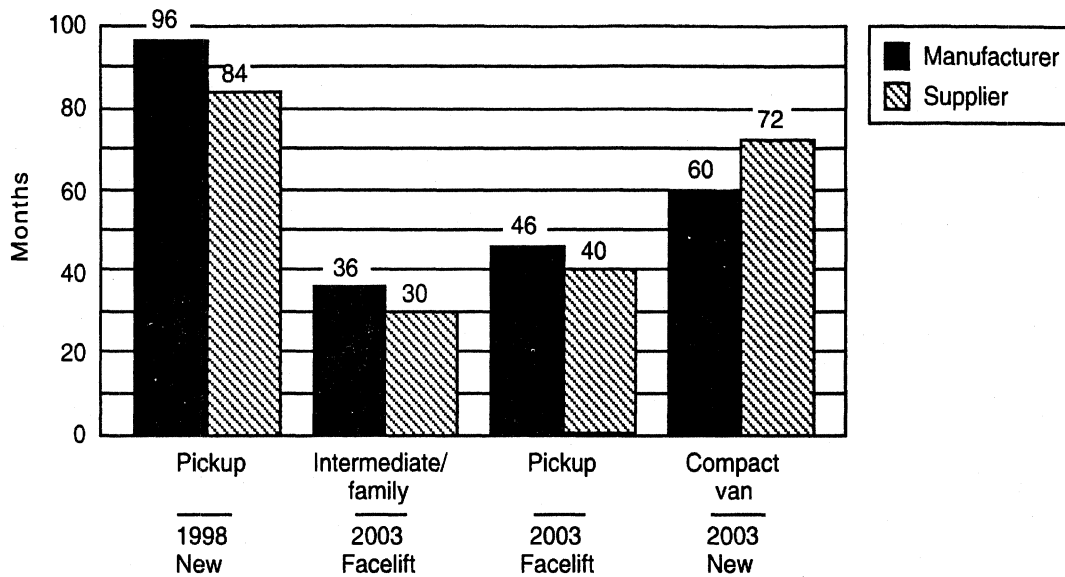
To remain competitive, panelists believe, passenger car platforms need to be updated every five years (luxury cars between every 56 and 50 months). By the year 2003, competitive vehicles will have facelifts between 30 months (luxury cars) and 36 months (entry level vehicles). Through the year 2003, light trucks are expected to remain competitive with platform cycle times between 68 months (sport utilities) and 84 months (pickups). Light truck face lifts are expected to require passenger car levels by 2003. Face lifts for light trucks may be required every 36 months for compact vans and sport utilities and 42 months for pickups.

Manufacturer/supplier comparison

The manufacturers and suppliers disagree on many of the forecast points. Except for compact van new platforms where differences occur, the suppliers believe that the product cycles must be shorter to remain competitive. The figure below presents the major areas of difference. The largest differences appear in the forecasts for year 1998 pickup new platform and the forecasts for year 2003 intermediate/family facelift, compact van new platform and pickup facelift.

While these are generalizations about each segment, these differences indicate a potential variation of strategy. If the suppliers do believe that product development cycles must be some two to twelve months shorter, then suppliers may be attracted to team with "winner" manufacturers—those manufacturers who have a well-oiled product development process. A second strategy variation that may develop follows capabilities. Suppliers may develop quick product development prototype capabilities. But if their customers do not feel similarly pressured, the total system will be limited by this weakest link.

Maximum Cycle to Remain Competitive by Segment



Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

This question supports MKT-26. MKT-26 asks how quickly the manufacturers can bring a product to market. MKT-28 asks how quickly the manufacturers must bring a new product to market. Facelift frequency through 1998 across all segments—passenger cars and light trucks (except pickups)—will be demanded at a rate of every three years. While the domestic manufacturers cannot match these expected demands today, the domestics will be able to meet this market condition by 1998. Companies must continually match their internal technology capabilities and cost structures with external market demands.

The panelists believe that the Japanese can currently meet this demand. Current yen/dollar levels, globalization efforts and other issues have placed tremendous pressure on the Japanese manufacturers. However, with product development—among other—advantages going into the fight, the Japanese will remain formidable competitors.

Although the precise number may be debated, the expectations for luxury cars—at 30-month facelift cycles—raises a red flag. The panelists believe that the domestics will be able to achieve only a 32-month turnover by 2003. Again, the panelists believe that the Japanese may have the ability to meet these 2003 market demands of 30 months.

It is interesting that the panelists indicate that the current new platform development performance levels of the Japanese and Americans will meet the market demands for the next decade. In fact, the current levels may be “too good” by some 12 months. If this is the case, improvements must focus on market accuracy and development costs rather than solely on reduction of time to market.

MKT-29 Please forecast, in thousands of units, the number of passenger cars and light trucks which will be sold in the United States and Canada by traditional domestic dealer networks and import dealer networks for 1998 and 2003.

Vehicle Sales by Market/Network	Est. 1992*	Median Response		Interquartile Range	
		1998	2003	1998	2003
U.S. total passenger car sales	8,211	9,100	9,500	9,000/9,200	9,300/9,800
Big Three	5,301	6,040	6,270	5,800/6,100	6,000/6,500
Japanese nameplates	2,471	2,560	2,730	2,500/2,700	2,650/2,950
European and other imports	439	500	500	434/500	450/500
U.S. total light truck sales	4,675	5,200	5,700	5,000/5,400	5,400/5,820
Big Three	4,002	4,450	4,910	4,400/4,668	4,668/5,059
Japanese nameplates	666	700	780	675/750	700/900
European and other imports	7	10	10	7/10	10/20
U.S. total vehicle	<u>12,886</u>	<u>14,300</u>	<u>15,200</u>	<u>14,000/14,400</u>	<u>14,862/15,600</u>
Canadian total passenger car sales	798	885	915	870/900	900/950
Big Three	472	538	553	500/550	545/600
Japanese nameplates	267	287	297	270/300	270/300
European and other imports	59	60	65	60/60	55/70
Canadian total light truck sales	429	490	510	477/500	497/550
Big Three	352	401	417	400/408	405/430
Japanese nameplates	75	87	90	80/90	80/100
European and other imports	2	2	3	2/5	2/5
Canadian total vehicle	<u>1,228</u>	<u>1,375</u>	<u>1,425</u>	<u>1,307/1,400</u>	<u>1,400/1,500</u>

* Source: *Automotive News*, January 11, 1993. This was provided to the panelists as a baseline.

Selected edited comments

- All unit sales growth and share growth will go to the Big Three. Japan will find it tougher to compete due to a strong yen, and the Europeans will suffer turmoil and shakeout.
- Japanese nameplate trucks will include units produced by the Big Three and sold with Japanese badges.
- Light trucks will continue to increase their share of the total vehicle market. I do not believe that the median response reflects a large enough increase.
- Sales in 1998 could be higher or lower depending on the timing of the cycle.
- The Japanese will try hard to compete in light trucks but with limited success.

Discussion

The total U.S. vehicle market is expected to grow from a 1992 base of 12.9 million units to 15.2 million units in 2003. While it can not be determined if the panelists foresee this to be a peak sales year in the next 10 years, it may be implied that the panelists foresee 1 to 2 million units being added onto the typical sales rates of the 1990 to 1992 period. At approximately 38 percent, light truck segment continues to remain strong through the year 2003. The Canadian market is expected to recover as well, reaching 1.4 million units by 2003. The 10 percent ratio between the United States and Canada remains in place. For the most part,

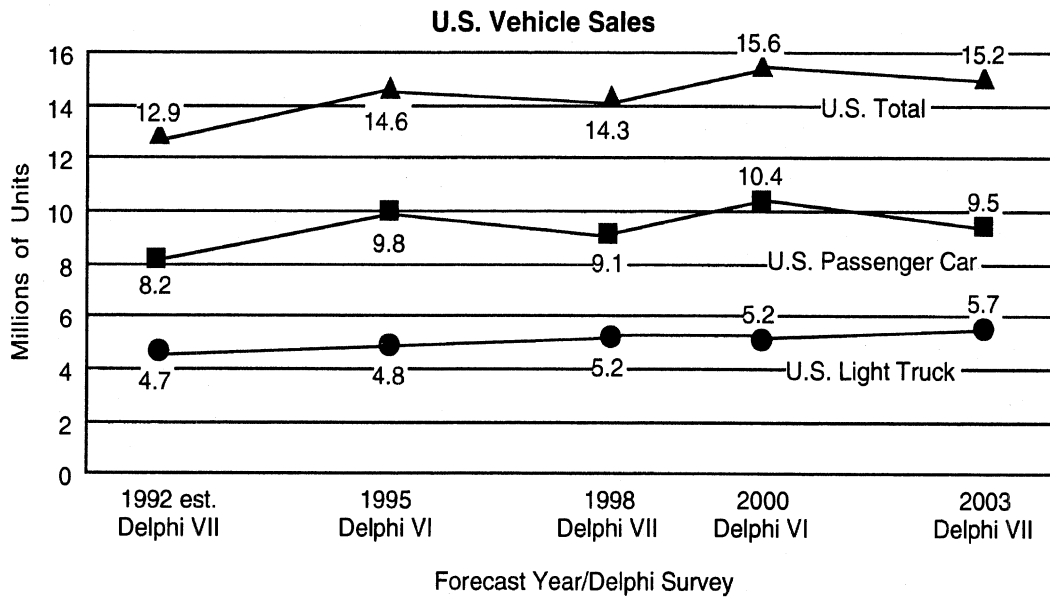
panelists predict current market shares will remain fairly constant. The Japanese may lose an additional percentage point in U.S. total market share by 2003.

Manufacturer/supplier comparison

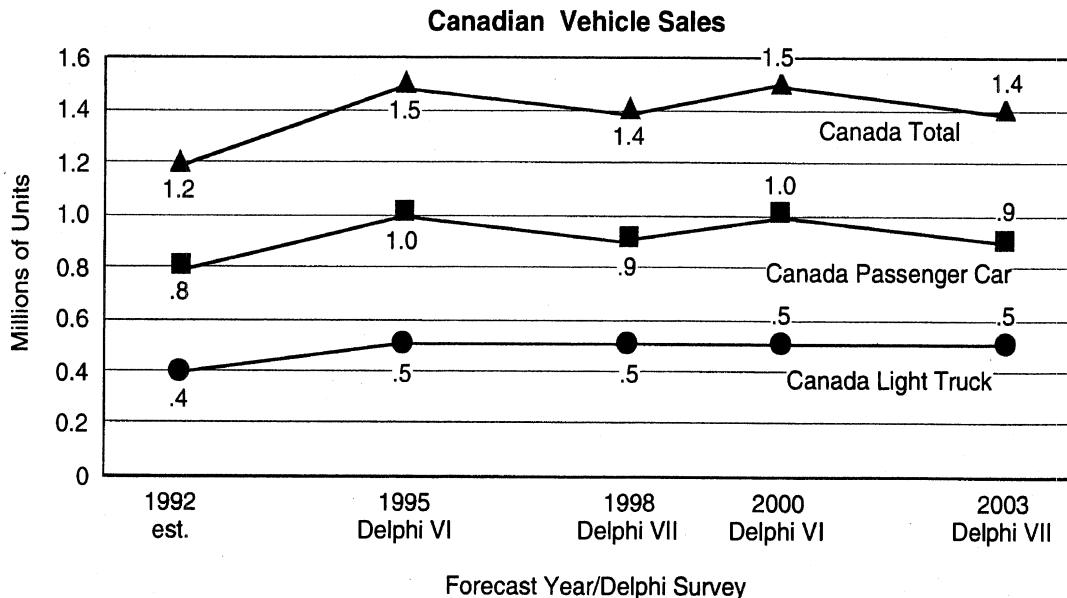
There is no substantial difference between the two panels.

Trend from previous Delphi surveys

As the graph shows, Delphi VII forecast numbers for 1998 and 2003 fall in line with the U.S. sales forecast established by the 1992 Delphi VI for 1995 and 2000. The current forecast is a bit lower than before. The Delphi VII forecast falls near the upward sloping trend line established by the previous study. Delphi VII forecasts indicate decreasing share for the Big Three—the 1992 Delphi VI predicts 64 percent passenger car share in 1995 and 62.5 percent in 2000. This compares to 66 percent Big Three passenger car share in 1998 and 2003 for Delphi VII. Big Three truck share also is predicted to improve, holding a constant 86 percent in 1998 and 2003. This compares to the 1992 Delphi VI forecast of 82 percent in 1995 and an 80 percent share in 2000.



The Canadian forecast trend is very similar to the forecast for the United States. The Delphi VII data points are slightly below the trend established in 1992; however, the points establish approximately the same slope. Like the United States forecast, the current Canadian forecast reverses the 1992 Delphi VI's forecast of slightly lower traditional domestic shares.



Strategic considerations

The panelists foresee that Japanese market share decline will plateau in the United States and Canada. They expect that U.S. Big Three passenger car market share will hold steady at 66 percent and Canadian share at 61 percent through the next decade. The truck share of the total U.S. market may plateau as well at 38 percent. At least one panelist comments that this truck forecast may be too low. However, the truck upper interquartile range is only 120,000 above the median. So, at most, the panel estimates a 39 percent share.

The estimated growth of the U.S. market, from its 1992 base, is approximately 1.5 percent. While the number of manufacturers marketing vehicles in the United States is expected to decline, this slow rate of growth will continue to force manufacturers, suppliers and dealers into tough competition. These estimates suggest that it is unlikely that the U.S. market will surpass the last sales record of 1986 (16.3 million units), anytime in the next 10 years. As indicated in MKT-1 and MKT-2, there are many variables which influence market demand. This explains the number of differing expert opinions on total market and segment share forecasts.

MKT-30 Please estimate total passenger car market share percent for the given segment and dealer outlet. We suggest that you first consider segment shifts, making sure that the total market adds to 100 percent. Next, consider the sources of vehicles within each segment, making sure that these add to 100 percent for each segment.

Passenger Car Sales by Segment	Est. 1992*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Lower small	12%	11%	12%	11/14%	10/15%
Traditional domestic	57%	60%	60%	57/60%	58/60%
Foreign	43	40	40	40/43	40/42
Upper/specialty small	21	29	29	20/22	20/23
Traditional domestic	69	70	70	67/70	67/70
Foreign	31	30	30	30/33	30/33
Lower middle	13	12	13	12/15	11/15
Traditional domestic	94	92	90	90/94	90/94
Foreign	6	8	10	6/10	6/10
Upper/specialty middle	31	29	29	29/32	28/33
Traditional domestic	84	85	85	80/85	80/85
Foreign	16	15	15	15/20	15/20
Large	9	7	6	8/10	6/9
Traditional domestic	100	100	100	100/100	98/100
Foreign	0	0	0	0/0	0/2
Lower/middle luxury	10	9	9	9/11	8/12
Traditional domestic	62	62	65	60/65	60/68
Foreign	38	38	35	35/40	32/40
Upper luxury/specialty	4	3	3	3/5	3/5
Traditional domestic	38	40	40	38/40	38/43
Foreign	62	60	60	60/62	57/62
Total	100%	100%	100%		

* Source: *Ward's Automotive Reports*, January 11, 1993. This was provided to panelists as a baseline.

No comments

Discussion

The upper/specialty small segment is likely to grow the greatest over the next 10 years. Panelists expect this segment to grow from 21 percent of the total 1992 market to 29 percent by 2003. This growth is supported by one to three percentage losses in each of the other six segments. Within each passenger car segment, panelists do not forecast any substantial shifts between traditional domestic and foreign market shares.

Manufacturer/supplier comparison

There are no substantial differences between the two panels.

Trend from previous Delphi surveys

This question's format and segment definitions have been substantially altered since the last survey. A direct comparison cannot be made.

Strategic considerations

There are no expected major changes in the makeup of the individual passenger car segments. The largest change is the growth of the upper/specialty small (Tracer, Capri, Golf, and Impulse) segment. This growth will come from a cross section of other segments including upper/specialty middle, large, lower/middle luxury and upper luxury/specialty. This poses a competitive threat to the traditional manufacturers, since the growing segment has a high percentage of foreign penetration and three of the four segments losing share are dominated by the domestic manufacturers.

These changes in total market segments will ultimately affect the manufacturers, and their suppliers, that market within each of these segments. Therefore, supplier strategic planning should be concerned about not only the overall level of vehicle demand, but segments, vehicle platforms and manufacturer nameplates demand. Component commonality across platforms—required to reduce product development timing—should increase production volume for suppliers winning new platform contracts. This increase in volume may counter a potential reduction in margin as differentiated components are driven to increased commodity status.

MKT-31 Please estimate total light truck market share percent for the given segment and dealer outlet. We suggest that you first consider segment shifts, making sure that the total market adds to 100 percent. Next, consider the sources of vehicles within each segment, making sure that these add to 100 percent for each segment.

Light-truck Sales by Segment	Est. 1992*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Small/middle sport utility	21%	22%	23%	21/23%	21/25%
Traditional domestic	88%	88%	88%	85/90%	84/90%
Foreign	12	12	12	40/15	10/16
Large/luxury sport utility	4	4	4	4/5	4/5
Traditional domestic	93	95	95	93/95	93/95
Foreign	7	5	5	5/7	5/7
Small/middle van	21	21	21	20/23	20/23
Traditional domestic	90	90	90	90/92	90/92
Foreign	10	10	10	10/10	8/10
Large van	8	7	6	6/8	5/8
Traditional domestic	100	100	100	100/100	100/100
Foreign	0	0	0	0/0	0/0
Small pickup	22	22	23	21/23	21/24
Traditional domestic	75	75	75	75/76	73/77
Foreign	25	25	25	24/25	23/25
Large pickup	24	24	23	22/25	20/25
Traditional domestic	100	97	95	91/100	90/100
Foreign	0	3	5	0/9	0/10
Total	100%	100%	100%		

* Source: *Ward's Automotive Reports*, January 8, 1993. This is provided to panelists as a baseline.

No comments

Discussion

The panelists foresee no substantial changes in the light truck market overall segmentation. The greatest change will occur as foreign nameplates begin to market into the large pickup segment—a segment which has, to date, been exclusively domestic manufacturers. The panel expects full-size pickup foreign share to reach 5 percent by 2003.

Manufacturer/supplier comparison

There is no substantial difference between the two panels.

Trend from previous Delphi surveys

This question's format and segment definitions have been changed dramatically since the last survey. A direct comparison cannot be made.

Strategic considerations

Over the next ten years, the large pickup segment is the segment to watch closely. The segment is expected to witness increased foreign competition. While very small in total numbers, the large pickup segment offers large profit margins for the traditional domestic corporations and halo products to establish brand equity. All the changes predicted are small. We strongly urge that companies track CAFE legislation, competitive entries, population demographics and other market forces that may change these stable expectations into dramatic market swings.

MKT-32 Please identify the current pros and cons of manufacturing in Mexico from your industry perspective. In regards to these identified issues, please list the potential opportunities and risks the North American Free Trade Agreement (NAFTA) offers.

Mexican manufacturing—Pros	Percent of Total Responses
Available and eager workforce	17%
Low labor costs	15
General lower cost advantage	13
Economic and market growth opportunities	13

Other responses include: proximity to customer (8 percent); content requirements (8 percent); new plant technology (4 percent); government incentives (4 percent); joint venture opportunities (4 percent); balance of trade credits (4 percent); existing supplier base (1 percent); fewer competitors (1 percent); flexibility (1 percent); local management (1 percent); and less regulation (1 percent).

Selected edited comments

- There is a broad base of existing automotive manufacturers and suppliers in Mexico.
- Workers are eager for employment.
- Government incentives for manufacturing plant investment are attractive.
- There are greater business opportunities.
- There are less environmental and work safety regulations.
- Low cost labor exists in Mexico.
- It is an attractive opportunity to set up operations right from the ground up.

Mexican manufacturing—Cons	Percent of Total Responses
Worker skills—assembly, engineering, technical, and management	38%
Uncertain economic and political environment—including exchange rates	12
Transportation costs	8
Culture and language	6
Infrastructure	6

Other responses include: bureaucracy (4 percent); import/export regulatory compliance (4 percent); environmental pollution (4 percent); U.S. labor relations (4 percent); management control and coordination (4 percent); local sources of capital equipment (4 percent); quality (1 percent); addressing symptoms not problems (1 percent); and capital requirements (1 percent).

Selected edited comments

- Mexico does not have enough experienced managers.
- NAFTA may lead to labor unrest in the United States.
- Regulation paperwork associated with crossing the boarder is difficult.
- The infrastructure quality of water, air, power and roads is very poor.
- This avoids facing the current global competitive problems in the U.S. manufacturing base (Japan will beat us in Mexico too).
- Training requirements are very severe.

NAFTA opportunities	Percent of Total Responses
Access to an improved Mexican economy	52%
Regional North American competitiveness	28
Reduction of tariffs and barriers	14
Cost reduction	7

Selected edited comments

- A combined North American market offers increased competitiveness.
- Mexico will receive most of the opportunities and advantages from NAFTA.
- NAFTA will help expand the Mexican auto market.
- NAFTA will reduce the complexity of trade regulations.

NAFTA risks	Percent of Total Responses
U.S. employment loss	52%
Creation of new competitors	11
Infrastructure	11
General unknowns	7
Increased management complexity	7

Other single responses include: increased pollution (4 percent); lack of general public support (4 percent); and world regionalization (4 percent).

Selected edited comments

- Competition will increase from emerging Mexican suppliers.
- The greatest risk comes from the flight of jobs and associated loss of U.S. wealth that could lead to a reduction in the U.S. market size.
- Increased industrialization will increase pollution.
- There is not much support from the general population.
- NAFTA is an unknown quality.

Discussion

For every Mexican manufacturing pro and NAFTA opportunity, there is an equal Mexican manufacturing con and NAFTA risk. Certainly, an available and eager workforce and access to a growing Mexican economy are opportunities all manufacturers must explore. However, lower initial levels of worker skills and U.S. employment loss are potential problems of U.S. foreign direct investment. The management of any transition to maximize the gains and minimize the losses must be well planned.

Manufacturer/supplier comparison

These comparisons are not made for open-ended questions.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

With the passage of NAFTA, as with any legislation or regulation, its impact will be determined by the interpretation and enforcement of its legal language and the implementation of its provisions. The answers to this question profile the great debate over NAFTA. On one hand, some parties argue that the attractiveness of a large and eager workforce at low wages and lower operating costs will draw a flood of American corporations across the border. Others argue that, the opportunity of economic growth and new markets offer a mechanism for creating more, not fewer, jobs. Some believe that workers and the environment will continue

to be sacrificed in the name of economic development. Others see NAFTA offering the stimulus to settle political uncertainty and build new infrastructure. Perhaps the statements above are a part of the confusion over the true meaning of NAFTA and the reason it created such strange political bedfellows: a pro (for example from our panel, labor rates) can be turned into a con, and a con (for example from our panel, uncertain economic and political environment) can be turned into a pro.

Our panelists present a wide range of opinions concerning the impact of NAFTA. Certainly much depends on the growth of the Mexican domestic market. A growing Mexican market will provide an expanding pie for vehicle manufacturers and suppliers. If the Mexican demand for automobiles—and original equipment and replacement parts, tooling, construction and all the other sectors that expand with automotive production—does not develop, then companies will be replacing one production source with another, rather than incrementally adding to existing production sites.

As with any change, the method of transition is critical. While NAFTA offers opportunities of doing business in Mexico, businesses should not blindly relocate simply based on a low wage strategy. Production processes, material logistics and managerial support must all support a production base. If even one element is missing, the operation will not maximize resource utilization.

MKT-33 There is a great deal of uncertainty over the changes likely to occur with the adoption of the North American Free Trade Agreement. Please indicate the perceived risk, in terms of U.S. production loss, that sourcing may be changed from the United States to Mexico. Please indicate your forecast where 1 = high risk, 3 = moderate risk, and 5 = low risk.

Vehicle System	Mean Rating
Electrical	2.2
Interior trim	2.3
Electronics	2.8
Vehicle assembly	2.9
Steering/suspension	2.9
Engine	2.9
Brakes	3.0
Transmission	3.1
Body/chassis	3.1

Other single responses include (followed by rating):

Plastic molding (1.0); tires (2.0); audio electronics (2.0); engineering (2.0); first tier supplier manufacturing (2.0)

Selected edited comments

- Any assembly with high labor content stands to be lost.
- Lower technology assembly is at risk.
- Higher value-added assembly will remain in the United States.

Discussion

U.S. production of electrical and interior trim components face the greatest risk, in terms of production loss, with the passage of NAFTA. While no production or employment is ever completely without risk, these two component types face substantial international competition. On the other end of the scale, the panelists believe transmission and body and chassis components have only moderate risk of production loss.

Manufacturer/supplier comparison

Generally these differences are small, and all are clustered tightly around a moderate risk rating. The greatest difference is electronics, where the manufacturers foresee high to moderate risk (2.0), and the suppliers rate electronics only moderately at risk (3.0). While the employment ramifications may be small (the manufacturers' U.S. plants are highly automated), the profit and value-added loss potential is great. Communities may face the loss of significant personal and real property tax bases from these capital-intensive plants. It is interesting to note that, for the most part, the manufacturers perceive a greater risk of lost U.S. production than does the supply base.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

The responses to this question identify the usual examples of component sourcing that might move to Mexico. Certainly, electrical and interior trim components are parts used as examples of components which have moved to Mexico without regard to NAFTA. Electronics is an interesting addition to this list. While the components are assembled on highly automated equipment and the components are easily transported, automated processing equipment takes continuous engineering and operator support to keep the lines operating.

In addition to uncertain vehicle market development, the greatest uncertainty regarding NAFTA is the transformation from the Mexican auto decrees to a more open trade environment. Locked in by local content, trade balance and other constraints, most Mexican plants have operated well under capacity and below economies of scale. How assembly plant and first tier supplier product and capacity plans change to reflect new trade provisions must be monitored. Once the agreement and all the side agreements are better understood, initial export and capital spending efforts may offer an idea of individual company strategies.

MKT-34 Please estimate the sources, in thousands of units, of North American passenger car and light truck production (U.S. and Canada) for the following years.

United States and Canada Sources of Production	Est. 1992*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Passenger Car					
Big Three-owned	4,993	5,300	5,500	5,300/5,500	5,500/5,700
Foreign-owned	1,691	1,800	2,000	1,800/2,000	1,900/2,000
Light Truck					
Big Three-owned	4,495	5,000	5,050	4,900/5,000	5,000/5,200
Foreign-owned	311	<u>400</u>	<u>420</u>	<u>400/500</u>	<u>400/600</u>
Total	11,490	12,600	13,100	12,500/13,100	12,900/13,850

* Source: *Ward's Automotive Reports*, January 18, 1993. This was provided to the panelists as a baseline.

No comments

Discussion

Foreign-controlled production in North America will increase to approximately 2.5 million units by 2003. This implies an increase of some 500,000 units. This will lower the Big Three production share by approximately two percentage points. Overall, North American production is expected to recover by more than 1.6 million units over the 1992 base to 13.1 million units.

Manufacturer/supplier comparison

While the two panels are in general agreement (within 10 percent), one forecast is very different. The manufacturers forecast higher light truck foreign nameplate penetration in the year 2003. The manufacturers estimate 700,000 units foreign light truck nameplated vehicles will be sold in 2003 versus 420,000 by the suppliers. Given that the manufacturers should be closer to product introduction and marketing plans, the higher forecast may be a more accurate forecast.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

Big Three production share of total United States and Canada build is expected to slip from 83 percent in 1992 to 81 percent in 2003. While this is not a large drop, the trend of at least 2.5 million units of foreign-owned assembly capacity has been well established. This growth (some 22 percent over the decade) indicates a continued shift of a customer base for U.S. suppliers and engineering service firms.

Light truck production, which may hit 50 percent or more for some manufacturers, is expected to remain approximately 39% of total production mix. Total production growth (1.3 percent per year) is expected to keep pace with general growth in sales (1.5 percent per year, MKT-29). Companies must restructure their internal cost, product development, marketing, and other structures to match this rate of growth.

MKT-35 For the following countries, please forecast, in thousands of units, passenger car and truck and bus production.

Vehicle Production	Est. 1992*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Japan					
Passenger car	9,412	9,500	9,700	9,000/9,700	9,100/10,000
Truck/bus	3,164	3,200	3,300	3,000/3,350	3,000/3,500
United States					
Passenger car	5,666	6,000	6,500	5,800/6,450	5,900/6,750
Truck/bus	4,119	4,300	4,500	4,200/4,800	4,300/5,000
Germany					
Passenger car	4,889	4,900	5,000	4,566/5,000	4,500/5,300
Truck/bus	338	350	400	338/400	350/500
France					
Passenger car	3,328	3,400	3,500	3,300/3,500	3,300/3,700
Truck/bus	364	380	400	360/400	365/425
Spain					
Passenger car	1,827	2,000	2,150	1,900/2,000	2,000/2,300
Truck/bus	323	350	350	350/400	350/400
Canada					
Passenger car	1,027	1,100	1,200	1,000/1,200	1,000/1,300
Truck/bus	946	980	1,000	950/1,000	950/1,100
Italy					
Passenger car	1,051	1,085	1,100	1,000/1,150	1,050/1,200
Truck/bus	94	100	100	100/100	100/102
South Korea					
Passenger car	1,234	1,350	1,325	1,300/1,500	1,400/1,600
Truck/bus	431	475	500	450/500	460/550
United Kingdom					
Passenger car	1,283	1,300	1,325	1,300/1,400	1,300/1,500
Truck/bus	260	275	285	260/300	260/300
Belgium					
Passenger car	1,051	1,100	1,100	1,000/1,100	1,000/1,150
Truck/bus	94	100	100	98/100	100/102
Mexico					
Passenger car	800	1,000	1,200	950/1,200	1,050/1,500
Truck/bus	300	350	425	340/400	380/500
Brazil					
Passenger car	806	900	950	830/900	850/1,000
Truck/bus	252	274	300	260/300	275/350

*Source: *Ward's Automotive Reports*, December 28, 1992. This was provided to panelists as a baseline.

No comments

Discussion

The world's top six producing automotive countries are likely to remain in the same order as 1992. Japan, the United States, Germany, France, Spain and Canada continue to dominate world production. Smaller producing countries—for example Mexico and Brazil—will experience the greatest growth rates. Countries suffering through recent recessions, such as the United Kingdom, will likely see a recovery.

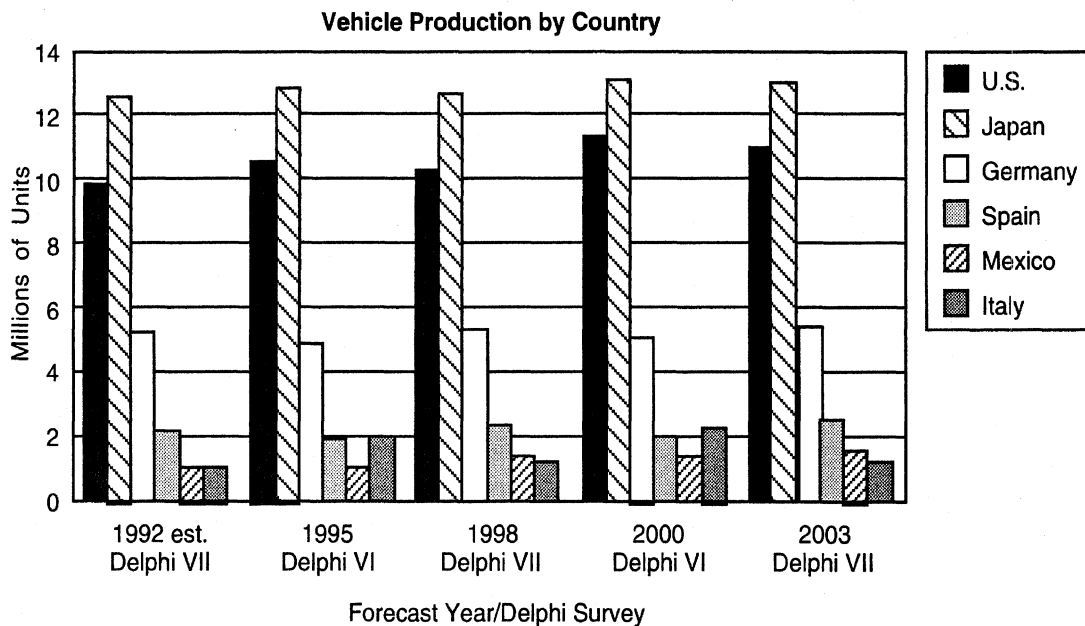
Manufacturer/supplier comparison

The manufacturers' and suppliers' forecasts are within 10 percent of each other for every 1998 forecast. There are five 2003 forecasts which are above a 10 percent differential. However, only three differences amount to over 100,000 units. The table below presents these differences. The suppliers are much more optimistic concerning Mexico's production capabilities. At 1.8 million units, the suppliers project that Mexico will surpass Belgium, the UK and Italy in terms of total production. The suppliers are also much more optimistic regarding Brazil, predicting a 24 percent rise in production from 1992 to 2003.

2003 Forecasts	Median Response (in thousands of units)	
	Manufacturer	Supplier
Mexico—Passenger car	1,000	1,300
Mexico—Truck/Bus	400	500
Brazil—Passenger car	890	1,000

Trend from previous Delphi surveys

Comparing this Delphi with the 1992 Delphi VI, Japan and the United States are expected, at best, to achieve through 2003 the Delphi VI forecast production level for 2000. (Please see the figure below). Japan and the United States are emerging from two weak production years. Three countries likely to gain the most are Germany, Spain and Mexico. This is not surprising since it is these same three countries that had the best growth rates since the survey two years ago (Germany rising 700,000 units or 15.5%, Spain growing 450,000 units or 23.5%, and Mexico increasing 400,000 units or 57%). Italy, the country with the greatest decline in production (850,000 units or -45%) from 1990 levels, is expected to have little gains in performance. The previous study predicted 2.3 million units from Italy in 2000, but political scandals, corporate management upheavals and liberalization of trade has cut this outlook to 1.2 million units by 2003.



Strategic considerations

It appears that the world is at another turning point in terms of total vehicle production. Automotive production through the 1920s was concentrated in the United States. This concentration was then shared with Europe through the 1950s. The 1960s and 1970s witnessed the dramatic growth of the Japanese. The Japanese production curve has plateaued as the Japanese domestic market matures, imports to Japan rise, and production is distributed globally.

It may be that the day of production concentration is over—that there will no longer be a country (or even region) that controls 25% of the world's production. Perhaps with free world trade or regional trading blocks, the world may witness the continued strength of the United States, Japan and Germany, as well as the growth of a cluster of countries producing between two and five million units. It is feasible that beyond 2003 this club may grow from only France and Spain to include Canada, South Korea, the United Kingdom and Mexico. Two countries certainly having the capability of joining the two million club are China and a

revitalized Italy. Countries below two million units of production per year, a third tier, appear to be dominated by one producer (such as Belgium with Ford) or having a government investment interest (such as India). Smaller countries will always attempt to develop an automotive industry because of its economic multiplier effect. This political objective will result in the continuing operation of industries producing between 300,000 and one million units.



MKT-36 There are several countries outside of the top twelve producers which are important production sources. Please forecast for 1998 and 2003, in thousands of units, passenger cars and truck and bus production for the following countries.

Vehicle Production by Country	Est. 1992*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Sweden					
Passenger car	297	300	300	285/310	250/320
Truck/bus	65	70	75	65/70	70/75
Australia					
Passenger car	253	265	265	250/275	250/290
Truck/bus	14	15	16	15/18	15/20
India					
Passenger car	182	200	250	195/250	200/300
Truck/bus	124	130	150	125/150	130/180

* Source: *Ward's Automotive Reports*, December 28, 1992. This was provided to panelists as a baseline.

No comments

Discussion

Of smaller producing countries, India is one that offers increasing interest. Panelists forecast production will grow from a 1992 base of 306,000 to 400,000 units by 2003. This is substantial as compared to the perceived futures of Sweden and Australia which are forecast to grow between 1992 and 2003, 4 percent and 5 percent, respectively.

Manufacturer/supplier comparison

There are no substantial differences between the two panels.

Trend from previous Delphi surveys

The new projections for Sweden, Australia and India are below the previous Delphi VI forecast trends. Delphi VI projected 400,000 units of total Swedish production in 1995 and 2000. Delphi VII's panelists do not believe Sweden will reach this level by 2003. Australia's production was projected to reach 500,000 units in 2000 by Delphi VI panelists. Delphi VII panelists do not foresee production surpassing 300,000 units. Total vehicle production in India was forecasted in Delphi VI to rise to 500,000 units, yet Delphi VII panelists project no more than 400,000 units by 2003.

Strategic considerations

While it is likely that these emerging countries will continue to experience production growth (and associated growth of a supporting parts industry), Sweden, Australia and India will not seriously challenge the top 12 producing countries. Sweden will continue to be a source of specialized cars for export. The industries of Australia and India will be important sources of local production for local consumption. The current growth rates do not particularly warrant special attention. However, movement towards regional trading blocks, mega-corporate mergers and joint ventures, and political reform may change investment patterns. Companies need to monitor how these events may change an industry's resources, capabilities and capacities.

MKT-37 Please forecast, in thousands of units, the number of total motor vehicle units which will be exported from the following countries in 1998 and 2003.

Vehicle Production by Country	Est. 1990*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Japan	5,832	5,900	6,000	5,800/6,000	5,600/6,300
Germany	2,766	2,800	2,800	2,600/2,900	2,500/3,000
France	2,316	2,350	2,400	2,300/2,400	2,200/2,500
Canada	1,699	1,700	1,800	1,600/1,800	1,700/2,000
Spain	1,253	1,350	1,500	1,300/1,500	1,300/1,700
Belgium	1,226	1,226	1,250	1,200/1,300	1,200/1,300
United States	953	1,000	1,200	1,000/1,100	1,050/1,200
Italy	901	900	800	860/940	800/960
United Kingdom	510	525	540	500/600	500/700
Korea	347	400	400	350/450	375/600
Mexico	227	350	500	300/400	350/600
Sweden	205	200	200	200/210	200/225

*Source: AAMA World Motor Vehicle Data, 1992. This was provided to panelists as a baseline.

No comments

Discussion

Today's major exporting countries—Japan, Germany, and France—will continue to dominate the world's export markets. The United States is forecast to experience a 26 percent (over a 1990 base) increase in exports, to 1.2 million units in 2003. Mexico may almost double their exports to 500,000 units by 2003.

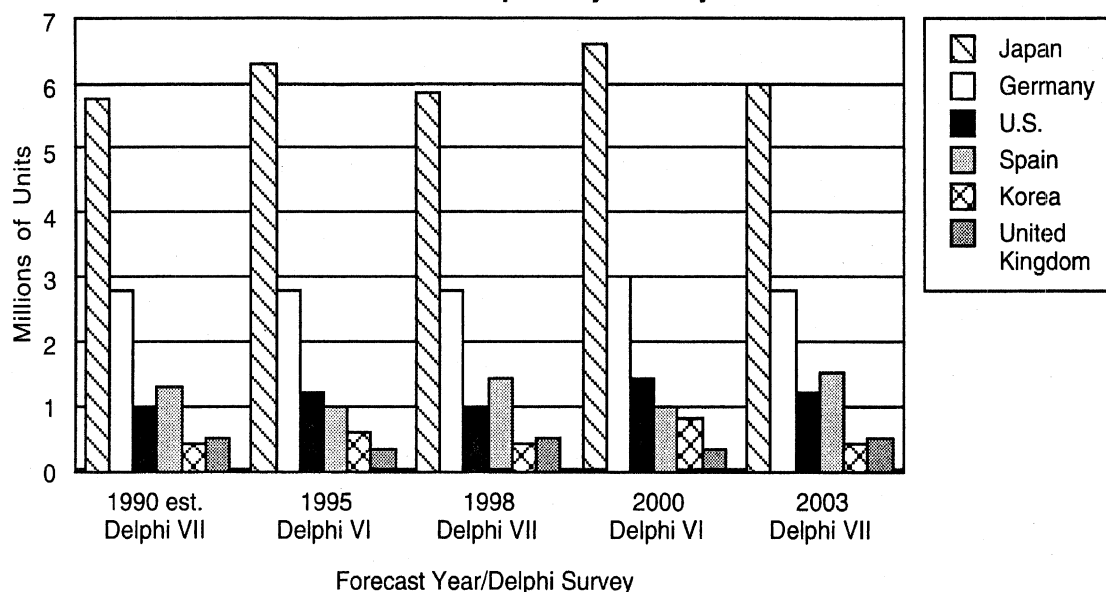
Manufacturer/supplier comparison

The manufacturers' and suppliers' forecast differences run between 0 percent and 7 percent for each 1998 projection except Mexico for 1998. The manufacturers forecast 300,000 units of exports from Mexico, while the suppliers forecast 400,000. The two panels are also in close agreement on 2003 forecasts, between 0 percent and 10 percent in all cases except Korea (manufacturers forecast 450,000 export units versus the suppliers' prediction of 400,000 units) and Mexico (manufacturers predict 350,000 exports versus the suppliers' expectation of 500,000 units). Considering this higher forecast, the suppliers foresee Mexico becoming a strategic, integrated base of production and sourcing by the world's vehicle manufacturers.

Trend from previous Delphi surveys

The current survey extends the export trend of several countries established by the 1992 Delphi VI. The current survey also places a few countries above and below these trend lines. The figure below presents these differences. For the most part, it appears that the Delphi VII panelists have corrected their forecasts to the market realities of the 1990 baseline numbers. Of course, a recovery of the world automotive market, coupled with aggressive political action on world trade treaties, could cause these forecasts to be low.

Motor Vehicle Exports by Country



Strategic considerations

Four countries are expected to experience double-digit export growth over the next 10 years: Spain, United States, Korea and Mexico. Without a doubt, the big winner will be Mexico—its exports are projected to more than double by 2003. In contrast, the four largest exporters are expected to experience growth over the total period of less than 6 percent. Japan will remain the dominant exporter. It is possible that Mexico may continue its meteoric growth rates, or its export trend may settle in a manner similar to Korea. Korea was the shining star of the past Delphi surveys, with expectations of exports rising up to 800,000 units per year. However, Korea's growth has reached a plateau, and it is generally not expected to become "the next Japan." Similar to the production forecast, there are first tier countries (in this case, Japan by itself), second tier countries (between 3 million and 1.5 million of annual exports), and third tier countries (between 1.4 million and 700,000 of annual export units). It is very likely that Mexico will surpass Korea and the United Kingdom after 2003 and achieve this third tier level.

For the suppliers, vehicle production globalization may require an increasing presence in more countries—whether that presence is a manufacturing operation, sales and marketing office, or engineering and technical liaison office. Perhaps a world car will never emerge. However, with global manufacturing, component sourcing, exports, marketing arrangements, ownership consolidation and component swapping, the world is getting smaller and smaller.

MKT-38 Please forecast total U.S. vehicle exports, in percent, by geographic destination.

U.S. Export To:	Est. 1991*	Median Response		Interquartile Range	
		1998	2003	1998	2003
South East Asia	40%	38%	37%	37/40%	35/40%
Europe	33	33	33	30/35	32/35
Middle East	16	16	15	15/16	14/16
Mexico/Latin America	8	10	12	10/12	12/15

*Source: AAMA World Motor Vehicle Data, 1992. This was provided to panelists as a baseline.

Selected edited comments

- "Specialty vehicles" (i.e., mini-vans, sport utility vehicles and luxury cars) will gain importance in export markets.

Discussion

Of the 1.2 million vehicles expected to be exported from the United States in 2003 (MKT-37), the destinations will likely be split between the entire South East Asia region (37 percent), Europe (33 percent) and the rest of the world (30 percent). This approximates the 1991 baseline information.

Manufacturer/supplier comparison

There is no substantial difference between the two panels.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

The mix of U.S. export destinations is not expected to change substantially over the next 10 years. There will be continued pressure to open markets in South East Asia and other markets which have been generally closed to imports. It will be interesting to monitor how aggressively the Big Three pursue these opportunities. Will the Big Three continue to use their foreign affiliates as their total operations in Asia, or will the Big Three aggressively invest, manufacturer and market in Asia? While these decisions are under the control of the individual companies, the decisions are influenced by tax incentives, subsidies and other governmental assistance programs that are initiated to support the country's foreign policy objectives. These political influences, while real, makes forecasting very difficult.

MKT-39 What percent of North American-produced passenger vehicles will be equipped with the following alternative fuel capabilities in 1998 and 2003?

Alternate Fuels	Est. 1992*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Flexible or variable fuel (Methanol/ethanol, gasoline blends)	0.5%	1.0%	3.0%	1.0/1.0%	2.0/3.0%
Electric vehicles	0.0	0.5	1.5	0.5/0.6	1.0/2.0
Electric/hybrid vehicles	0.0	1.0	1.5	0.3/1.5	1.0/2.5
Natural gas	0.0	0.5	1.0	0/5	0.5/2.0
Propane	0.0	0.1	0.5	0.0/0.5	0.0/0.5

* Source: OSAT estimates from various sources. This was provided to panelists as a baseline.

Selected edited comments

- Electric vehicles will increase faster than we think, much faster!
- Electric/hybrid is the near term, to 2005. The future is for zero emission vehicles (ZEV).
- Products with the biggest upside potential are flexible fuel and natural gas vehicles.
- Regardless of the environmental laws, the public will not purchase electrics without a major technological breakthrough.

Discussion

A variety of alternative fuel capabilities may be operating in limited numbers by 2003. Panelists forecast 3 percent of the North American produced passenger cars will use variable fuel systems. Electric and electric hybrids may capture up to 1.5 percent of the 2003 production mix. Natural gas and propane may be a small share of the new fleet in 2003.

Manufacturer/supplier comparison

The suppliers are much more optimistic than the manufacturers in their median 1998 forecasts in regards to electric/hybrid vehicles (1 percent versus 0.5 percent), and propane fuel usage (1 percent versus 0.1 percent). Regarding 2003, suppliers rate electric/hybrid at 1.5 percent of the market versus 1.0 percent for the manufacturers. These are substantial differences and may stem from a difference in opinion on market acceptance, technology innovation, cost and other market determinates. Because each of these vehicle types requires significant R & D expenditures, human resource commitment and component development time, it is essential that the manufacturers and suppliers exchange marketing and other information. Perhaps the results of this question are persuasive enough to encourage the involvement of suppliers in all of USCAR's activities.

Comparison of forecast: MAT-4

The Marketing and Materials panels are in reasonable agreement. The table below compares the Marketing panel results with the Material's passenger car forecast. While each of the represent limited production, the Marketing panel forecasts larger penetration rates for hybrids. The Materials panelists indicate greater shares for flexible or variable fuels, natural gas and propane vehicles.

Alternate Fuels	Est. 1992*	1998		2003	
		MKT	MAT	MKT	MAT
Flexible or variable fuel (Methanol/ethanol, gasoline blends)	0.5%	1.0%	2.0%	3.0%	5.0%
Electric vehicles	0.0	0.5	0.5	1.5	1.0
Electric/hybrid vehicles	0.0	1.0	0.2	1.5	1.0
Natural gas	0.0	0.5	1.0	1.0	2.0
Propane	0.0	0.1	0.5	0.5	1.0

*Source: AAMA World Motor Vehicle Data, 1992. This was provided to panelists as a baseline.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

Gasoline will remain the dominant fuel through 2003. Adding the upperquartile range of each forecast, alternate fuels might reach a maximum application rate of 10 percent. While this is a tenfold increase in as many years, the infrastructure and product will remain relatively unchanged. The initial investments in infrastructure (refueling and service stations) and product development will be expensive (on the public and private side). Based on a public policy decision to reduce the amount of transportation petroleum consumption, this expense must be distributed across a larger base than the direct customer market. MKT-22 and MKT-46 identify the need for direct rebates or tax incentives to bring the selling price of alternative fueled vehicles to current market levels. By doing so, higher costs are distributed away from the early adopters and to the general tax base.

These forecasts may cast a shadow on the possibility of mass, alternative fuel markets. However, the efforts of USCAR and the Super Clean Car initiative, the reallocation of national lab, defense, and energy budgets to commercial markets, and the revision of public policy creation from a command and control to market-driven orientation requires special attention. These efforts may formulate technology breakthroughs, strategic alliances and market initiatives that dramatically change current customer cost-benefit ratios, production cost structures and other limitations. If these breakthroughs occur, forecasts based on current conditions become outdated and new forecasts based on new base points or application rates are required. This opens up market opportunities to serve these new fuels while placing—however slight—businesses supporting gasoline engines at risk.

MKT-40 Please forecast the total domestic and import U.S. market application rate, in percent, of the following powertrain and chassis features in 1998 and 2003.

Powertrain/Chassis Features	Est. 1991 MY*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Passenger Car					
Multi-valve cylinder engine	33.0%	40%	50%	40/45%	50/55%
Turbocharger/supercharger	1.0	1	1	1/1	1/1
Active suspension control	1.0	2	3	2/3	3/5
Four-wheel drive	1.0	2	2	1.5/2	2/4
Light Truck					
Four-wheel drive	34.0%	36%	40%	35/38%	40/40%
Multi-valve cylinder engine	7.0	10	15	10/15	15/20
Turbocharger/supercharger	0.5	1	1	0.5/1	1/1
Active suspension control	0.0	1	1	1/1	1/2

* Source: Wards 1992 Automotive Yearbook and Automotive News 1992 Market Data Book. This was provided to panelists as a baseline.

No comments

Discussion

Multivalve engines may capture up to 50 percent of the 2003 passenger car market. Turbochargers and superchargers, active suspension controls and four-wheel drive will continue to be offered on passenger cars, but each systems' penetration rates will likely remain below 3 percent. Multivalve truck engine applications will likely double over the next ten years to 15 percent penetration. Light truck four-wheel drive applications, reinforced by moderate fuel price increases, may increase to 40 percent of the total market.

Manufacturer/supplier comparison

There is no substantial difference between the two panels.

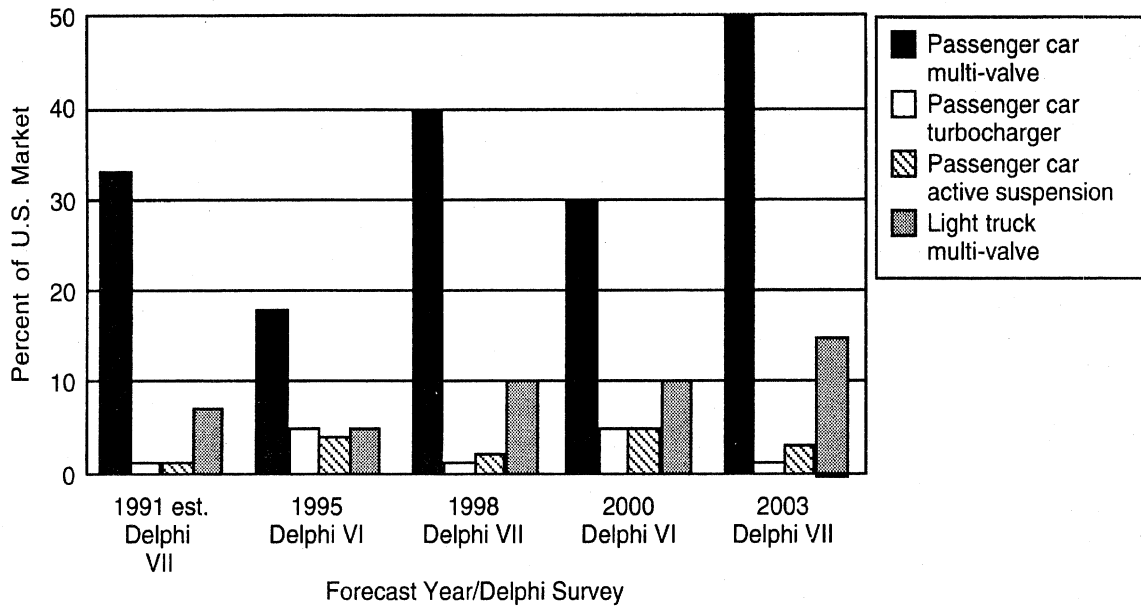
Comparison of forecast: TECH-57, TECH-75, TECH-77 and TECH-90

The Marketing and Technology panels are in general agreement regarding future applications of engine, suspension and power drive systems.

Trend from previous Delphi surveys

Passenger car turbochargers/superchargers and active suspension control penetration rate trends are down from the previous Delphi survey. In contrast, multivalve engine penetration expectations for passenger cars and light trucks is significantly higher in Delphi VII. The table below presents these differences. The current trends for the other features closely matches the 1992 Delphi VI panelists' expectations.

U.S. Penetration Rates



Strategic considerations

Working to satisfy sometimes conflicting demands of increasing fuel economy, reducing emissions and improving consumer appeal requires a full arsenal of powertrain technology. Clearly, one powertrain technology every manufacturer will depend upon is multivalve engines. In fact, in the near future, some manufacturers' new engine plans will completely drop passenger car engine push rod designs. This will make the way for base engine platforms from which multivalve engines may be developed.

Manufacturers must not blindly chase the application of multivalve engines. Cost of manufacturing, performance criteria and durability characteristics must all support the particular powertrain-vehicle combination in its market segment. Exceeding one or two market demands while failing on a third could place a vehicle at a competitive disadvantage. Multivalve engine applications that appear cost prohibitive by themselves become achievable when broad engine platforms are developed that share product engineering, production and assembly tooling, and components. Another development which may alter the slope of the application trend is the sharing of engines among manufacturers. While this has occurred in a limited manner in the United States, European firms are increasingly swapping parts to achieve economies of scale. Witness the use of an Opel engine in the new Saab 900.

MKT-41 Please forecast the total domestic and import U.S. market, in percent, of the following brake system technologies in 1998 and 2003.

Brake Systems	Est. 1991 MY*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Passenger Car					
Antilock brake system	17%	40%	75%	40/50%	70/80%
Four-wheel disc brakes	12	20	30	17/20	25/35
Traction (anti-spin) control	1	5	10	5/10	10/25
Light Truck					
Two-wheel antilock brakes	67%	70%	70%	60/70%	60/80%
Four-wheel antilock brakes	11	20	30	15/25	20/40
Four-wheel disc brakes	1	3	5	3/5	5/8

* Source: *Wards 1992 Automotive Yearbook*. This was provided to the panelists as a baseline.

Selected edited comments

- I believe light truck traction control penetration will reach 3 percent in 1998 and 8 percent in 2003.
- Light trucks will be increasingly dominated by minivans and compact, sport utility vehicles. These vehicles will have many carlike features.

Discussion

Antilock brakes applications for passenger cars and light trucks will increase through 2003 to cover at least 70 percent of each market. Four-wheel disc brake applications will grow as well to a forecast level of 30 percent. Passenger car traction control systems may reach 10 percent of the 2003 market, a tenfold increase from 1991 model year penetration rates.

Manufacturer/supplier Comparison

The manufacturers forecast greater penetration in 1998 and 2003 of light-truck four-wheel disc brakes. While the penetration rates may be small, the penetration shares identified by the manufacturers indicates the likelihood that a four-wheel disc brake option will spread to a wide variety of programs. The manufacturers forecast the four-wheel disc brake market to be 5 percent in 1998 (versus 3 percent for the suppliers) and 8 percent in 2003 (versus 5 percent for the suppliers). Reflecting the higher percentage of four-wheel disc systems, the manufacturers forecast 70 percent two-wheel disc brake system penetration in 2003 versus 75 percent for the suppliers.

Comparison of forecast: TECH-58 and TECH-59

The Technology and Marketing panels are in agreement with regard to passenger car and light truck traction control and four-wheel disc brakes. The panels vary on the ABS forecasts. The results for antilock brakes are summarized below.

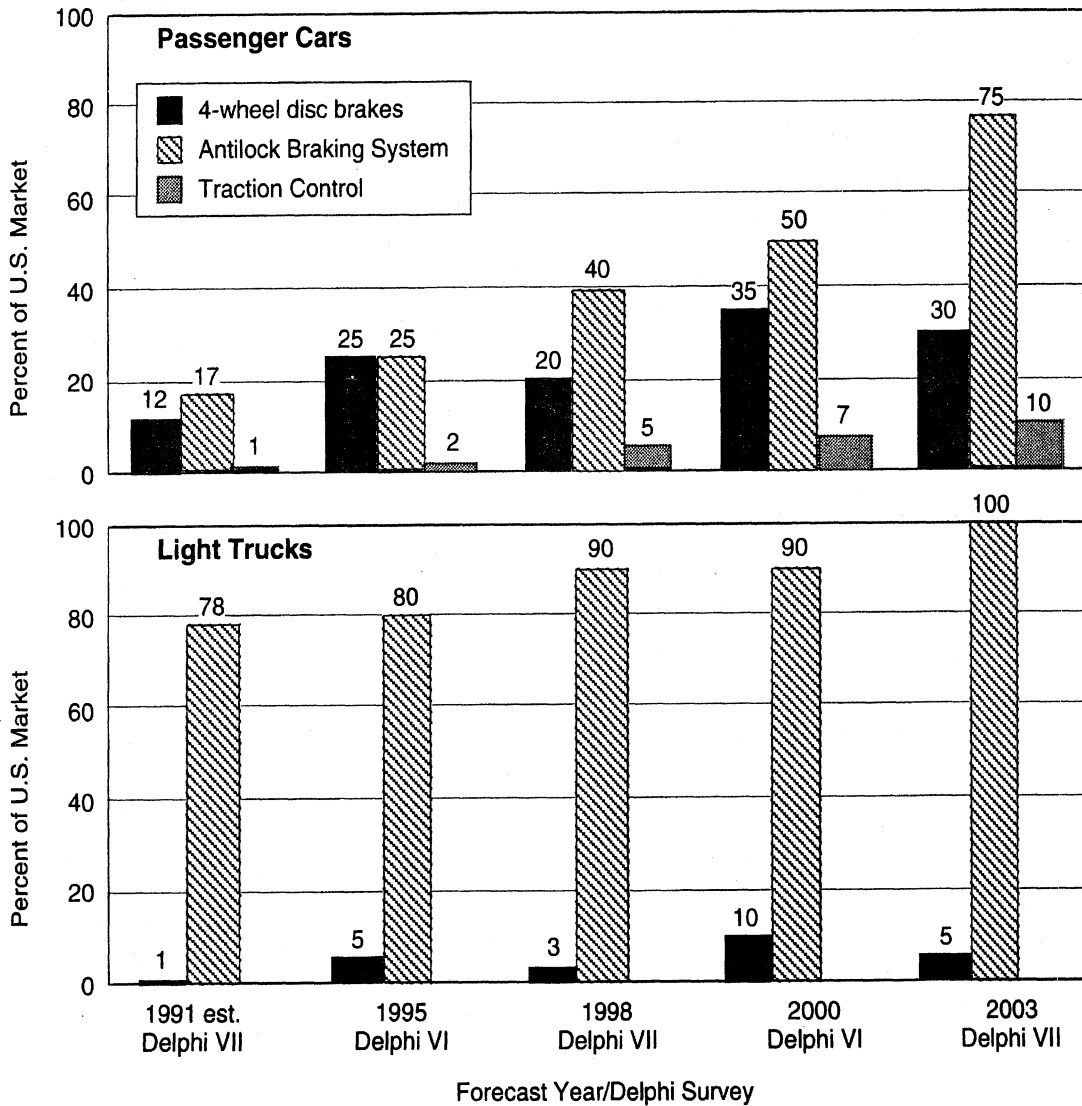
Antilock brakes	1998		2003	
	MKT	TECH	MKT	TECH
	40%	60%	75%	90%

The Technology panelists forecast higher penetration of antilock brakes for 1998 and 2003. The Marketing panelists may be more influenced by the cost of this feature.

Trend from previous Delphi surveys

The passenger car brake system trends are in-line with the 1992 Delphi VI forecast. (Please see the figure below). Compared to the 1992 Delphi VI, current expected ABS growth is on a steeper application curve. This may be the result of the dramatic decline in ABS systems cost over the last two years. Four-wheel disc brake systems, while at a pace to double current application rates, are expected to grow slower than previously expected. This change is most likely the result of newer disc/drum systems providing reasonable percentages of total performance at a given lower price (as compared to the cost of development, engineering, and components of a comparable four-wheel disc systems).

U.S. Penetration Rates



Delphi VII light truck brake system application rate forecasts fit the trends established in the 1992 Delphi VI. The value of ABS systems (two-wheel and four-wheel) is well established. Applications will approach 100% by 2003. Four-wheel disc brake penetration, in trucks, as with passenger cars, is expected to trail-off from the 1992 forecast. Because the single and double axle ABS systems are so effective using disc front and drum-rear brake combinations, the current panel has tempered the previous expected rates of four-wheel disc growth.

Strategic considerations

Proving the point that opportunities exist even in the most mature markets, ABS application rates will reach at least 75% on the passenger car side and 100% on the light truck side by 2003. The ABS market also proves the corollary axiom that growing markets and profit pools attract an increasing number of competitors. The world's most competitive suppliers from Bosch to GM's Automotive Component Group and from Kelsey-Hayes to Lucas all produce a wide variety of ABS systems. This competition has increased development budgets and production capacity and placed pressure on profit margins. Competitive firms are those with a high value component system, strong OEM relations, and efficient internal systems including product development, manufacturing and finance.

While on a slower total growth curve, passenger car traction control systems are projected to reach 10 percent by 2003. Traction control, supported by concurrent ABS product engineering and production capacity on the manufacturing front and reasonable incremental product cost over installed ABS equipment on the marketing front, will be a growth opportunity for suppliers after the ABS market matures. Traction control availability has been pushed down into the compact market with Saturn. Demand for ABS has been driven by increasing consumer understanding, declining prices and improving product performance. These three attributes will likely drive traction control demand.

MKT-42 Please forecast the total U.S. passenger car market, domestic and import, penetration rate (in percent) for the following "smart" vehicle systems.

Driver Convenience Features	Median Response		Interquartile Range	
	1998	2003	1998	2003
Near object detection (back-up warning)	1%	3%	1/1%	2.5/5%
Adaptive cruise control (automatic speed adjustment)	2	7	1/5	5/10
Collision warning (front, rear and side radar)	1	5	1/2	2/6
Night vision enhancement	1	5	1/2	2.5/5
Radio call for help locator	2	10	1/4	5/15

Selected edited comments

- Adaptive cruise control (ACC) and collision warning will be equipped as one system.
- I am not sure that any of these technologies will be ready, technically or at a reasonable cost, in this time frame.
- People will pay for these safety features.

Discussion

Radio call for help indicators (a device that automatically sends a distress signal upon accident or other panic situation) and adaptive cruise control (automatic speed adjustment) have the greatest expected market potential. Panelists believe radio call for help and adaptive cruise control may be installed in 10 percent and 7 percent of the 2003 U.S. passenger car market, respectively. Other advanced smart vehicle systems such as near object detection, collision warning and night vision enhancement might gain between 3 percent and 5 percent market penetration in 2003.

Manufacturer/supplier comparison

There are several differences between the two panels, yielding a mixed set of results. The manufacturers are more optimistic towards some systems and suppliers more optimistic on others. Adaptive speed control is an innovation which both groups agree has great market potential. The other systems are more speculative, expected to grow to no more than 5 percent of the market by 2003. The table below presents the differences between the two panels.

Driver Convenience Features	1998		2003	
	Manufacturers	Suppliers	Manufacturers	Suppliers
Near object detection	0.5%	1%	3%	5%
Adaptive cruise control	4	2	11	7
Night vision enhancement	0	1	3	5

Trend from previous Delphi surveys

The only feature we specifically asked the 1992 Delphi VI panelists to project was collision-avoidance or warning systems. The 1992 Delphi VI panelists projected initial, experimental offerings by 1995 (1 percent) with broader availability and application (4 percent) by 2000. Delphi VII respondents agree with these general thoughts, taking the application rate to 5 percent by 2003.

Strategic considerations

The two systems expected to have the greatest potential over the next 10 years are built off enabling technology—the technology and hardware already installed in an automobile that supports the introduction of another technology. In the case of adaptive cruise control, the enabling technology is the existing cruise control system. By adding a vision or radar unit to the front of the vehicle and additional logic in the cruise control controller box, a consumer may step relatively inexpensively into a type of collision avoidance system. The radar unit senses the distance to an object ahead, the logic calculates the rate of closure and the existing cruise control equipment regulates the vehicle speed.

In the case of radio call for help, the enabling technology is the airbag system and the existing global positioning system (GPS) or its equivalent. In the event of an accident which deploys the airbag, a radio signal could automatically trigger a message to a location determining system. A mayday signal with vehicle location will dispatch an emergency team.

The consumer is familiar with the technology of these systems. Unlike night vision enhancement which requires Star Wars-type equipment, adaptive cruise control and radio call for help can be added to a vehicle without the customer even being aware of its presence. The benefits are also more immediately recognizable. These two attributes contribute to the panelists' belief that adaptive cruise control and radio call for help will gain early customer acceptance.

MKT-43 Please indicate the percentage of North American-produced passenger cars that will use steel, aluminum or other wheels by 1998 and 2003.

Wheel Material Usage	Est. 1992	Median Response		Interquartile Range	
		1998	2003	1998	2003
Steel	67%	63%	59%	60/65%	50/63%
Aluminum	33	37	39	35/40	37/50
Other	0	0.1	2	0/2	0/5

*Source: *Ward's Automotive Reports*, December 1992. This was provided to the panelists as a baseline.

Other responses include:

Composites (2 responses)—1998: 1 percent and 2 percent; 2003: 2 percent and 10 percent.

Magnesium—1998: 1 percent; 2003: 3 percent.

No comments

Discussion

It is expected that composites and magnesium may have limited applications for wheels in 2003. Still, most vehicles—59 percent—are expected to roll on steel wheels. Aluminum may increase its penetration rates from a base of 33 percent in 1992 to 39 percent in 2003.

Manufacturer/supplier comparison

The manufacturers and suppliers are within 10 percent of each other in their steel and aluminum forecasts. The suppliers believe there will be applications of composite and magnesium wheels. The manufacturers do not expect composite or magnesium markets to develop. The suppliers forecast wheels made of materials other than steel or aluminum will enter the market with 1 percent penetration rates in 1998 (the manufacturers forecast zero percent) and 2 percent in 2003 (versus the manufacturers' forecast of 0.5 percent). It should be remembered that suppliers' enthusiasm is always dampened by the lack of OEM contracts.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi Marketing survey.

Strategic considerations

Steel will remain the dominant wheel material. Aluminum will continue to make inroads based on weight savings and styling advantages. Composites have been used in the past on production passenger car wheels. However, production and quality difficulties forced the removal of the composite wheel. By 2003, steel and aluminum will have a small level of competition from magnesium and composites. The usage growth of these materials will depend upon the decision economics created by material weight savings demands, perceived customer value and potential corporate profit.

MKT-44 Customer purchasing priorities vary with fuel price. Please indicate the priority (where 1 = extremely important, 3 = moderately important, and 5 = least important) consumers place on the following vehicle purchase attributes at \$1.15 and \$3.00 per gallon of fuel.

Vehicle Purchase Attributes	Mean Rating	
	\$1.15/gallon fuel	\$3.00/gallon fuel
Passing acceleration	2.2	2.5
Size and comfort of vehicle	2.3	2.8
Acceleration from zero m.p.h.	2.7	3.3
Driving range	3.0	2.3
Refueling convenience and speed	3.0	3.0
Perceived environmental desirability of fuel	3.4	2.9
Top speed	3.4	3.7
Fuel cost (dollars/refueling, ¢/mile)	3.4	1.8
Fuel economy	3.4	1.7

No comments

Discussion

As is to be expected, the marketing panel expects vehicle purchase criteria to change if fuel prices rise. At \$1.15 per gallon of fuel, consumers' general priorities are thought to be passing acceleration, size and comfort of vehicle, and acceleration. If fuel prices increase to \$3.00 per gallon, fuel economy, fuel cost (in terms of dollars per refueling or operating costs per mile) and driving range are the three criteria most likely to rise on a customer's comparison list.

Manufacturer/supplier comparison

There is no substantial difference between the two panels.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

Given that public policy supports the reduction of petroleum consumption by the transportation sector (for air quality, trade balance and national security reasons), then the responses to this question support the change from a CAFE-based energy saving policy to an energy cost-based system. It is apparent that at \$1.15 per gallon, fuel economy and fuel cost are perceived as the two lowest of nine purchase considerations. Passing acceleration, size and comfort and acceleration—attributes directly in opposition to fuel savings—are at the top of a customer's shopping list.

In contrast, at \$3.00 per gallon, our panelists believe fuel economy, fuel cost and driving range will dominate the customer's shopping list. Top speed, acceleration, and refueling convenience and speed fall to the lowest priorities. While \$3.00 per gallon may be politically impossible, the dramatic reversal of consumer priorities is evident. Markets will remain disjointed as long as CAFE regulations impose restrictions on the supply side of the automobile market and the market price of gasoline pulls the demand side in the opposite direction.

MKT-45 For the following features, please estimate the highest purchase price which will permit a 25 percent passenger car penetration rate. Recall that an average vehicle cost \$17,000 in the 1993 U.S. market.

Feature	Median Response	Interquartile Range
	1993 MY	1993 MY
Active suspension	\$200	\$150/300
Collision-avoidance systems	200	200/300
Compact disc players	200	150/200
Traction (anti-spin) control	200	150/250
Navigation information systems	150	100/200

No comments

Discussion

Panelists estimate that active suspension, collision-avoidance systems, compact disc players and traction control must be priced no higher than \$200 before consumers will demand these features in at least 25 percent of the U.S. market passenger cars. Navigation information systems, it is projected, need to be priced at \$150 in order to achieve 25 percent penetration.

Manufacturer/supplier comparison

The manufacturers believe more than suppliers that customers value navigation information systems. The suppliers believe more than manufacturers that customers value compact disc players. Customers, the manufacturers estimate, will equip 25 percent of their vehicles with navigational information systems at \$175 retail. The suppliers believe the market will bear only \$150. Compact disc players, suppliers predict, will penetrate 25 percent of the market at \$200. Manufacturers forecast that the incremental price may be only \$150. The two panels agree upon the price of the other three features.

Trend from previous Delphi surveys

Over the past two years, our panelists indicate that the customer's perceived value of each of these features has decreased. This change may have resulted from the feature losing inherent value (such as active suspension versus ABS) or compared to other methods of performance (CD versus improved tape players). The 1992 Delphi VI panelists believed collision avoidance systems could be priced at \$400, active suspensions at \$250, navigation information systems at \$250, compact disc players at \$250 and traction control at \$200 and still penetrate 25 percent of the market. These features, it is estimated, are valued today at the same to one-half the 1992 value.

Strategic considerations

While these are simply our panelists' perception of customer value of various options, it is obvious for future penetration growth that the current and projected prices of these advanced features need to be lowered significantly. Suppliers and vehicle manufacturers should pursue component cost reduction through economies of scale, part number consolidation, design, manufacturing improvements and other advances. The customer's transportation dollar is stretched to the point that additional features must be priced very low or offer high levels of perceived value. To increase future penetration rates, suppliers and manufacturers need to work together—from product design to component sourcing—to lower the manufacturing cost of these products.

MKT-46 "Green" marketing may create new opportunities. However, significant uncertainty exists regarding consumer priorities and perceived value. For each vehicle attribute, please estimate the highest passenger car cost increase which customers will allow while still permitting the capture of at least 25% of the mid-sized and mid-priced market (approximately \$17,000).

Green Marketing Attributes	Median Response	Interquartile Range	Comments
100% Recyclability	\$100	\$25/100	<ul style="list-style-type: none"> ■ "Green" customers are the target here. ■ Most people do not care if the car is 100% recyclable. ■ Recyclability may be more saleable than <u>zero</u> emissions. ■ There is not much desire to pay, but customers want it considered. And it would be more receptive with credits when the car is scrapped. ■ Thirty percent of Americans are willing to spend \$100 per year recycling trash. ■ This sounds good, but what does the customer get in return? ■ Vehicles are 75% recyclable today. Consumers will not pay for this. Recyclability will help a company's image.
40 mpg fuel economy	\$300	\$250/500	<ul style="list-style-type: none"> ■ This is available today. It is worth nothing if gas prices remain low. ■ \$1,000 is the present value of gasoline savings of a 40 mpg car versus 27.5 mpg at \$1.20/gallon, assuming 12,000 miles driven per year over 10 years at a 10% discount rate. Consumers are rational! ■ Consumers can purchase these today, but do not see the need to sacrifice comfort, and performance. ■ The technology is available today. ■ Fuel economy payback is easy to quantify in the consumer's mind. ■ Most people will pay a lot for this feature even though it does not save them as much money as they think. It may save the average consumer only \$150 per year. ■ Moving from 25 mpg to 40 mpg for 12,000 miles per year at \$1.25 per gallon equals \$375 per year savings, \$750 over two years.
Low polluting vehicle manufacturing	\$100	\$0/100	<ul style="list-style-type: none"> ■ Consumers assume this. They cannot see it; they will not pay for it. ■ Manufacturers must provide without passing along costs. ■ People assume the government controls in this area are adequate. ■ This is an OEM problem, not the consumers. OEMs advertise advances in this area, most will open a bag of snakes. ■ Manufacturers must aggressively market this concept for it to be a perceived value.

Zero emissions	\$200	\$100/500	<ul style="list-style-type: none"> ■ At a \$400 increase interest drops to less than 25% market share. ■ Emissions in new vehicles are already low. Consumers want this as a given; they will not pay for it. Consumers are conditioned to expect some emissions. ■ The customer will not pay extra for zero emissions. ■ This is something the government and certain lobbying groups want. The customer has not been asked. ■ Customers want it, but there are problems with perceived value versus safety features. ■ Most consumers feel it is good enough if 99% of emissions are removed. Why pay extra for the last 1%? ■ This is only appropriate in the Los Angeles region. ■ Customers will not pay a large amount for this <u>by choice</u>. ■ Actual price depends on state laws. ■ Acceptance depends on the vehicle size and performance compromises. ■ These vehicles have to be as usable and inexpensive as today's internal combustion engine vehicles.
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Selected edited comments

- Consumers may be interested in low emissions and high recyclability, but not in perfection of these two attributes.
- Surveys have indicated that while the customer may want these items, they are not willing to pay extra for them.
- The average consumer thinks these are great ideas, as long as someone else pays for it.
- The customer will not "pick up the tab" for an OEM to be environmentally fashionable.
- What people say something is worth to them, a reservation price, often exceeds what they will actually pay.

Discussion

Customers may be willing to pay \$300 to achieve 40 mpg in the mid-priced and mid-sized market. Zero emissions, 100 percent recyclability and clean manufacturing are worth, it is estimated, to be worth \$100 to \$200. These prices reflect a projected 25 percent penetration rate.

Manufacturer/supplier comparison

There is no substantial difference between the two panels.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

The specific numeric responses of this question are perhaps not as important as the qualitative comment responses. The exact consumer value is most likely not the median response, the value is too difficult to determine. Even if the customer is willing to pay twice the median response, these "green" marketing attributes will not likely command more than \$200 to \$600 retail. The corollary question, of course, is the likely manufacturer costs to deliver these attributes. The combined answers to these two questions results in the profit incentive, or lack thereof. It is interesting to note that panelists believe consumers value these "green marketing" attributes close to the high-technology features in MKT-45.

Our panelists may be a bit hard on environmental marketing. Environmental marketing becomes attractive when being environmental increases market sizes, market shares or profits. For example, the drive for recyclability is reducing the number of plastics used within a system. If this eliminates supplier contracts or increases the amount of a single resin purchased, costs may be reduced. Pollution may be looked upon as a wasteful byproduct. By stressing low polluting vehicle manufacturing, a company can reduce the amount of direct materials and energy used in a production process. This strategy reduces overall costs because a company is cleaning up the input side of the production process rather than trying to clean up the waste stream. If companies look at environmental marketing in this manner, the cost of environmentalism is reduced to the extent that operating costs are reduced as well.

MKT-47 Please forecast the total domestic and import U.S. market, in percent, of the following factory-installed comfort and convenience items in 1998 and 2003.

Comfort Options	Est. 1992 MY*	Median Response		Interquartile Range	
		1998	2003	1998	2003
Air conditioning	88%	90%	93%	90/90%	90/95%
Sunroof	13	15	17	15/15	15/20
CD players	3	8	15	5/10	8/25

* Source: Wards 1993 Automotive Yearbook. This was provided to panelists as a baseline.

Selected edited comments

- I assume this is given current audio technologies (e.g., digital audio tape would not be available to compete against CDs).

Discussion

At an estimated 2003 penetration rate of 93 percent, air conditioning may become a standard feature on most vehicles. Sunroof suppliers will likely experience moderate growth patterns as penetration rates are increased from a 1992 model year base of 13 percent to 17 percent. Factory-installed CD players are expected to increase penetration fivefold to a 15 percent level in 2003.

Manufacturer/supplier comparison

Except for the applications of sunroofs, the manufacturers believe there are greater market potentials than the suppliers for each of these comfort and convenience features. For the suppliers, this is good because it is the manufacturers who make the market through option packaging and pricing strategies. The table below presents the differences between the two panels.

Comfort Options	Median Response			
	1998		2003	
	Manufacturers	Suppliers	Manufacturers	Suppliers
Air conditioning	90%	90%	95%	90%
Sunroof	15	15	15	18
CD player	10	7	20	15

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

Although the consumer dollar is stretched to the breaking point, comfort and convenience items continue to grow in popularity. This is a testament to the fact that an increasing amount of time is spent in an individual vehicle because of increasing congestion, vehicle miles traveled and length of ownership. These features, in addition to providing driver and occupant enjoyment over the life of the car, also increase resale value. Suppliers of these features will likely see increasing sales, particularly in recovering markets, since both the market and the usage will be increasing at the same time.

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Supplier and Sourcing Issues

MKT-48 "Partnering" is a popular term used to describe future customer-supplier relationships. However, there is no common definition of "partnering." From your viewpoint, in describing future customer-supplier relationships, what are the five most critical concepts, characteristics, or features of "partnering"?

Critical Partnering Features	Percent of Total Responses
Commitment (long term interdependence and trust)	22%
Well defined and equal sharing of responsibilities	21
Full-disclosure and open idea exchange	9
Early and integrated supplier involvement in product development	8
Jointly defined and consistent performance benchmarks	6
Focused market orientation	6

Other responses include: value-based purchasing (4 percent); respect for supplier viability (3 percent); cost competitiveness (3 percent); continuous improvement (3 percent); ethics (3 percent); management level relations (2 percent); full-service capabilities (2 percent); warranty expense coverage (2 percent); quality and timelines of service (2 percent); full-service capabilities (2 percent); single-sourcing (2 percent).

Selected edited responses

- Both parties must be willing to break from traditional purchasing-sales approaches.
- Customer-supplier partnerships require a common understanding of cost targets and the need for profitability.
- Expectations and behavior must be consistent by both partners.
- Mutually compatible goals should be defined by both partners.
- OEM and suppliers must respect each others' capabilities.
- OEMs must have a sense of responsibility to protect the viability of the supplier.
- Open, honest communication between suppliers and customers build relationships.
- Parties must respect confidentiality.
- Partnering involves a common ground in the definition of success.
- Partners must sense an equitable sharing of risk and reward.
- Partnership requires early end-customer needs definition.
- Partnerships involve senior management level relationships and mutual respect.
- Shared incentives are required for mutual improvement.
- Supplier relationships should be treated like marriage—adapting to unforeseen changes rather than like strict legal agreement.
- There should exist an acceptance and sharing of each other's cost savings ideas.
- Warranty cost-sharing will become required.

Discussion

Suppliers and manufacturers working to develop partnerships should focus on building long-term interdependence, defining and sharing responsibilities, developing mechanisms to exchange ideas openly, and integrating supplier knowledge into the product development process. These attributes complement and reinforce one another.

Manufacturer/supplier comparison

These comparisons are not made for open-ended questions.

Trend from previous Delphi surveys

Delphi VI panelists identified the following key components of a customer-supplier partnership:

- Common goal definition (27 percent of total responses)
- Knowledge and support of partner profitability (17 percent)
- Mutual trust (14 percent)
- Equal commitment (13 percent)
- Long-term contracts (9 percent)

Considering the list above, it is obvious that our panelists are still concentrating on developing common objectives, language and responsibilities as a basis for partnership. These concepts are broad enough to include a wide range of specific actions required for implementing true partnerships. Delphi VII panelists identify two specific actions: early supplier involvement in product development and a focused market orientation. Perhaps the industry has spoken about the broad concepts long enough to make issues such as common goal definition and support of partner profitability normal operating procedure. It is time the industry moves to making the implementation steps common practice as well.

Strategic considerations

The value of strong supplier partnerships is intuitively well understood. A partnership fully leverages the supplier's resources for the benefit of the customer. The customer, in turn, benefits the supplier through continued contracts, systematic production scheduling and other rewards to make the relationship mutually dependent. The true implementation of partnerships, however, is very difficult. While this question addresses partnerships at an industry level, it must be understood that partnership requirements are unique to each company and executed at a personal, individual level.

The identified partnership criteria are at a very macro level. Companies attempting to implement these criteria should examine each attribute individually. For example, how does each party define commitment? How will responsibilities be defined and valued to assure equal burden and just retribution? What mechanisms are available to facilitate open idea exchange? The answers to these questions outline a series of cross-exploratory questions firms must answer to implement a working partnership. The comments lend additional detail to the thoughts behind the identified critical partnering features.

MKT-49 What do you believe are the five major issues and long-term strategic considerations underlying outsourcing decisions, both manufacturing and design/engineering, by the major U.S. vehicle manufacturers? Please consider vehicle manufacturer and supply base competitiveness, value-added, and project management issues.

Outsourcing Issues and Strategic Considerations	Percent of Total Responses
Cost competitiveness, including labor	19%
Competitive competencies, capabilities and capacities	12
Current labor commitments	10
Product technology and innovation	10
Reduced cycle time and flexibility—supplier product development involvement	8
Product quality and value	7
Location of engineering control	7
Ability to manage networked capabilities	6
Confidence in outside suppliers	5
Capital risk sharing	5

Other responses include: OEM financial and payback requirements (3 percent); reduced vertical integration strategies (3 percent); existing supplier contracts (2 percent); need for continuous improvement (2 percent); in-house supplier politics (1 percent).

Selected edited responses

- A barrier continues to be the ability of OEMs to fulfill their labor agreements.
- Ability, or lack thereof, to generate profits drives these decisions.
- All industry participants need a true and factual understanding of cost drivers.
- Companies must find the lowest cost alternative as this drives "make versus buy" decisions.
- Companies need to focus on core manufacturing and engineering skill competencies .
- Companies need to take quick advantage of emerging technology.
- Companies outsourcing face the loss of "traditional" control and important proprietary knowledge.
- Control of supplier quality, cost, and delivery is an issue.
- Cost reduction potential drives "make versus buy" decisions.
- Employment security in labor contracts and overall labor relations control the rate and content of outsourcing.
- Engineering services and capabilities influences outsourcing location.
- Flexibility and access to use the latest technology needs to be considered.
- It depends upon the duration and specifics of the particular sourcing decision.
- OEMs and suppliers are searching for available capital and best-in-class "technical" workers, design and production quality, technology, creativity, and overall value.
- OEMs are looking for new technology development to reduce time to market.
- OEMs are looking to share capital and other risks.
- OEMs must recognize supply base capabilities.
- OEMs will not outsource without confidence for the supplier's long-term existence.
- One decision criterion is the competitive status of in-house suppliers versus outside suppliers.

- Outsourcing displaces fixed cost or capital investment. It may or may not lower overall industry capital requirements.
- Outsourcing and downsizing affects the ability to respond to market changes.
- Outsourcing effectiveness depends upon supplier commitment and the partner relationship.
- Outsourcing forces the ability to leverage key suppliers.
- Outsourcing introduces organizational impediments to streamlined project management.
- Outsourcing reduces OEM head counts.
- Outsourcing requires sharing technology between partners.
- Payback commitment of OEMs determines "make versus buy" decisions.
- Practice is determined by perceptions of OEM-required critical capabilities and perceptions of supplier ability to deliver.
- Stability of OEM senior management determines the success of outsourcing.
- Systems management capabilities are required to gain outsourcing benefits.
- The level of outsourcing depends upon the degree of freedom an OEM is willing to give up.
- There is an OEM management change driving them away from vertical integration.

Discussion

Vehicle manufacturer outsourcing strategies offer implications to the manufacturers and suppliers. The marketing panelists believe the key to competitive customer-supplier relationships lies in optimizing cost competitiveness, core competencies, current labor commitments and product innovation.

Manufacturer/supplier comparison

These comparisons are not made for open-ended questions.

Trend from previous Delphi surveys

The 1992 Delphi VI panelists provided the following outsourcing considerations:

- Control of component engineering and design (18 percent of total responses)
- OEM commitment to customer-supplier relationship (14 percent)
- Reduction of vehicle development costs (13 percent)
- Vehicle manufacturer job security requirements (12 percent)
- Control of quality throughout the supply chain (7 percent)

Costs, competitive capabilities and quality remain common outsourcing concerns. While some of the descriptions may have changed, it appears that the root concerns identified in the 1992 Delphi VI remain the same today.

Strategic considerations

The make/buy decision will continue to test the manufacturers and suppliers alike. Costs, competencies, capabilities, capacities and commitments appear to be the "five Cs" of outsourcing. These five qualities can be played as a defensive strategy if a plant is trying to keep current product, or as an offensive strategy if a plant is trying to win new customers and production contracts. The identified issues and the edited comments prove that an outsourcing decision is far from a simple, isolated net present value equation. Strategies regarding labor, supplier integration, capacity utilization, capital allocation and others must all come together across all the thousands of individual purchasing decisions made in a year. These individual decisions must be supportive and complementary of each other such that on a corporate level the "five Cs" are optimized.

MKT-50 Purchasing criteria priorities change over time. Given the following criteria, please indicate the importance (where 1 = most important, 3 = moderate importance and 5 = least important) of the Big Three vehicle manufacturer purchasing activities today, and five years from now.

Purchasing Criteria	Mean Rating	
	1994	1998
Price	1.5	1.5
Quality performance	1.8	1.6
Delivery performance	2.1	1.8
Manufacturing competence	2.1	1.7
Engineering competence	2.4	1.9
Supplier's long-term relationship with customer	3.0	2.4
Effective management of supplier's supply base	3.1	2.5
Effective management of supplier human resources	3.7	3.1

Other single responses include (followed by rating):

Problem resolution—1994: 3; 1998: 2.

Productivity—1994: 3; 1998: 1.

Selected edited comments

- Chrysler is very progressively working with suppliers and target prices.
- Cost disclosure should be added to this list.
- Price is king everywhere—quality is a given.
- Purchasing criteria varies considerably between the OEMs.
- This is difficult to rate due to the major differences in Big Three approaches. Ford Q1 and TQE stresses non-price criteria while GM's current approach stresses price. There is very little consistency in approaches.

Discussion

Today, purchase decisions are believed to emphasize price, quality, delivery and manufacturing competence. By 1998, panelists project that price, quality, manufacturing competence, delivery and engineering competence will be the primary supplier differentiators. It is becoming obvious that suppliers must deliver on all fronts—not simply have one or two business specialties.

Manufacturer/supplier comparison

From the table below, it is obvious that the manufacturers and suppliers differ on the perceived purchasing criteria ranking today and in the year 1998. While there are numerous communication efforts between the two parties, there are still significant holes. Even beyond disputes over price, the year 1998 differences on issues regarding second tier supplier management and supplier's long term relationship are excellent examples of opinion differences. Supplier strategies and investment requirements to achieve second tier supplier management excellence include quality self-certification, supply base rationalization, and design and development integration. Manufacturers rate this capability fourth in 1998. Suppliers rate it seventh. To match their customers' expectations, suppliers must focus on investments and human resource allocations.

The fact that suppliers rank supplier long term relationship as a low criterion illustrates the level of distrust that continues within the industry. Have customer-supplier relations improved? Yes, without a doubt. But, a great deal remains to be done.

Purchasing Criteria	Mean Rating (Ranking)			
	1994		1998	
	Manufacturers	Suppliers	Manufacturers	Suppliers
Quality performance	1.5 (1)	1.9 (2)	1.4 (1)	1.6 (2)
Delivery performance	1.8 (2)	2.1 (3)	1.6 (2)	1.8 (4)
Engineering competencies	1.9 (3)	2.5 (5)	1.8 (3)	1.9 (5)
Manufacturing competence	1.9 (3)	2.1 (4)	1.6 (2)	1.7 (3)
Price	1.9 (3)	1.5 (1)	1.8 (3)	1.4 (1)
Effective management of supplier's supply base	2.4 (4)	3.3 (7)	1.9 (4)	3.2 (7)
Supplier's long-term relationship with customer	2.5 (5)	3.1 (6)	1.6 (2)	2.5 (6)
Effective management of supplier human resources	3.3 (6)	3.8 (8)	2.9 (5)	3.2 (8)

Trend from previous Delphi surveys

From the 1992 Delphi VI panelist's view of 1996, price, delivery, quality, and manufacturing and engineering competencies were the top five considerations. These purchasing criteria remain the same today. It does appear that the spread of the ranking from first through fifth has tightened. Quality, the top criteria for the 1992 Delphi VI's 1996 vision, ranked 1.1, or very important. Engineering competence, the fifth consideration, ranked 2.2, or important. The current Delphi VII grouping lies between 1.5 and 1.9, a range of only 0.4 on our 5 point scale. This indicates that suppliers may not excel in only one area and expect contract awards. Suppliers must excel across all areas.

Strategic considerations

There are no surprises in this question's responses. Price will remain the number one purchasing criterion. However, it does become a first among near-equals. The range in current priorities of 0.9 on our five point scale is cut by more than half to 0.4 range by 1998. Today's relative ranking of the eight factors remains the same five years out. The fundamentals of continuous improvement in quality, delivery, engineering, manufacturing and price will be difficult to avoid.

MKT-51 There is debate regarding increased OEM requirements for suppliers without OEM compensation. Please indicate your belief (where 1 = strongly agree 3 = neither agree nor disagree, and 5 = strongly disagree) that the OEMs currently possess adequate techniques for supplier evaluation and that the OEMs are adequately compensating suppliers for these activities.

Supplier Attributes	Mean Rating	
	OEMs Adequately Evaluate	OEMs Adequately Compensate
Design/engineering expertise	2.7	3.2
Continuous improvement	2.8	3.4
Flexibility	3.0	3.2
Core competencies	3.0	2.2
Price/value	3.0	3.3
Proven functional technologies	3.0	3.3
End-user knowledge	3.3	3.1
Global coordination	3.4	3.5
Life-cycle management	3.6	3.5

Selected edited comments

- Cost disclosure should be added to this list.
- Japanese OEMs are very realistic about paying for service and value. U.S. OEMs have no idea about long term partnering, what it means or how to obtain it. It has always been a power relationship rather than a partnership of give and take for mutual benefit.

Discussion

Panelists believe more effort needs to occur to better evaluate and compensate suppliers on emerging purchasing criteria such as life-cycle management, global coordination and flexibility. These are attributes manufacturers claim suppliers will need in the future. However, only through identification of requirements and provision of profit incentives will the suppliers respond in appropriate ways.

Manufacturer/supplier comparison

The manufacturers and suppliers generally agree that the OEMs have adequate evaluation methodologies for continuous improvement mechanisms, design/engineering expertise, flexibility, core competencies and proven functional technologies. (Please see the table below). The two panels also agree that end-user knowledge, global coordination and life-cycle management have less than adequate evaluation mechanisms. Not surprisingly, the manufacturers believe they adequately evaluate the suppliers price/value contribution. However, suppliers disagree with this statement. When it comes to price, we may never see these two groups agree.

The interesting division between the two groups occurs in the consideration of adequate compensation for these characteristics. The OEMs believe they adequately compensate the suppliers for every one of these characteristics: end-user knowledge, life-cycle management and global coordination. The suppliers do not believe that the OEMs adequately compensate them on any given criterion. No one will argue against the need of a supplier to support an OEM through the identified supplier attributes. One can question whether the OEMs are receiving the best supplier support if the suppliers do not believe that the OEMs are providing compensation for this support. As in MKT-50, the responses to this question identify the need for continuous improvement in customer-supplier communication.

Supplier Attributes	Mean Rating			
	OEMs Adequately Evaluate		OEMs Adequately Compensate	
	Manufacturers	Suppliers	Manufacturers	Suppliers
Price/value	2.5	3.1	2.0	3.5
Continuous improvement	2.7	2.8	2.7	3.5
Design/engineering expertise	2.7	2.7	2.5	3.2
Flexibility	2.7	3.0	2.7	3.3
Core competencies	2.8	3.0	2.5	3.3
Proven functional technologies	2.8	3.1	2.3	3.4
End-user knowledge	3.5	3.3	3.0	3.2
Global coordination	3.7	3.4	3.3	3.5
Life-cycle management	3.7	3.6	3.0	3.6

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

Core competencies—the resources (physical, human, financial and intangible) providing a company a sustainable competitive advantage—is the only factor the entire panel believes are being adequately compensate suppliers for by the OEMs. This is interesting, since the panel can, at best, neither agree or disagree that the OEMs can adequately evaluate core competencies. As the industry continues to talk about value pricing, it is critical that the industry have the wherewithal to evaluate suppliers, judge value provided and adequately compensate for value provided. Only through this process will suppliers have economic incentives to perform upfront R & D and contribute to vehicle manufacturer innovation. Of greatest concern is the panel's last place ranking of the ability to evaluate life-cycle management contribution. Consideration of warranty cost, recycle value, consumer loyalty, and others is critical to truly implement value pricing.

MKT-52 Considering the next 10 years, please identify the changes in value-added by each industry participant you expect at each functional stage. Please indicate a "1" where you expect sharply increasing participation and value-added, a "5" where you expect sharply declining participation and value-added, and a "3" where the amount of value-added will remain the same.

Changes in Value-Added	Mean Rating			
	Design	Product Engineering	Manufacturing	Assembly
Vehicle Assembly				
Vehicle manufacturer	2.9	3.3	3.0	2.7
1st tier supplier	2.0	1.8	2.3	2.0
2nd tier supplier	3.1	3.0	2.9	3.0
Engineering service firm	2.4	2.3	2.3	2.9
Powertrain				
Vehicle manufacturer	2.8	2.8	3.0	2.9
1st tier supplier	2.3	2.1	2.3	2.3
2nd tier supplier	3.1	3.0	2.9	3.0
Engineering service firm	2.6	2.6	2.7	3.0
Electronics				
Vehicle manufacturer	3.3	3.5	3.4	3.5
1st tier supplier	1.6	1.6	1.6	1.7
2nd tier supplier	2.9	2.8	2.8	2.8
Engineering service firm	2.6	2.7	3.1	3.2
Interior				
Vehicle manufacturer	3.3	3.5	3.6	3.3
1st tier supplier	1.8	1.7	1.8	2.8
2nd tier supplier	2.8	2.8	2.8	2.7
Engineering service firm	2.8	2.9	3.0	2.0

Selected edited comments

- Electronics changes are driven by technology. Interior changes are driven by labor costs.
- The importance of tier one suppliers will increase in virtually all areas. The degree of change is different for each vehicle manufacturer. Chrysler relies much more on suppliers than the other manufacturers do.
- Vehicle Assembly and Powertrain: The vehicle manufacturers will be downsizing and moving more responsibility outside. The manufacturer will focus on assembly with some tier one participation, (e.g., modular assemblies). There is potential for engineering service firms to perform manufacturing in the future.
- Electronics: Electronics can provide a manufacturer a competitive edge. Electronics will likely be developed in-house (e.g., GM with Hughes). The manufacturers are likely to hire more electrical engineers versus mechanical engineers.
- Interior: There will be a decrease in vehicle manufacturer product engineering, while tier one product engineering will increase.

Discussion

The current focus on process re-engineering and value-added analysis requires manufacturers and suppliers to identify the appropriate level of activity by the vehicle manufacturer, supplier and service contractors. The first tier supplier will gain more design, product engineering, manufacturing and assembly responsibility. Much of this increase, panelists forecast, will come from a decrease in vehicle manufacturer control.

Manufacturer/supplier comparison

The manufacturers and suppliers agree (within 0.5 points on a five point scale) on the general design trends of the industry. There are a significant number of differences in regards to product engineering, manufacturing, and assembly trends. The table below presents these differences.

Change in Value Added	Mean Rating					
	Product Engineering		Manufacturing		Assembly	
	Manufacturers	Suppliers	Manufacturers	Suppliers	Manufacturers	Suppliers
Vehicle Assembly						
Vehicle manufacturer	—	—	2.5	3.1	2.7	2.8
Engineering service firm	—	—	3.3	2.7	3.3	2.8
Powertrain						
Vehicle manufacturer	—	—	2.5	3.1	—	—
Engineering service firm	—	—	—	—	3.4	2.9
Electronics						
Vehicle manufacturer	2.8	3.6	2.8	3.5	—	—
Engineering service firm	2.5	3.1	—	—	—	—
Interior						
Vehicle manufacturer	—	—	—	—	3.2	1.9
1st tier supplier	—	—	—	—	1.7	2.8
2nd tier supplier	—	—	3.3	2.8	—	—
Engineering service firm	—	—	3.4	2.9	3.4	2.4

Considering the top level of vehicle manufacturing, both groups identify the engineering service firms as having future product engineering opportunities. However, as the number of platforms is reduced, these markets may become smaller in terms of the total amount of business to go around.

Perhaps the most significant outcome of the powertrain forecast is that the vehicle manufacturers are expecting more manufacturing involvement by the OEMs, while the suppliers believe some of the outsourcing trends will remain the same as today.

The vehicle manufacturers expect to take an increasing role in electronics product engineering and manufacturing. Vehicle manufacturers believe that assembly work will continue to be outsourced. For interior components, it appears that the manufacturers see a decreased role for engineering service firms. The suppliers believe there will be an increase of supplier activity across all outsourcing opportunities. The manufacturers are strongly targeting first tier suppliers to add interior assembly value-added. The suppliers have not identified this as strong a trend.

This matrix presents an interesting method of outlining and analyzing outsourcing strategies. While somewhat confidential, the customer-supplier relationship will be assisted if this type of information were exchanged.

Trend from previous Delphi surveys

This question was not asked in any previous Delphi survey.

Strategic considerations

The first tier suppliers are in the best position to pick up electronics and interior components business. After a number of years, interior component outsourcing is a fairly well-known entity. Electronics is interesting because it is typically used as an example of what the vehicle manufacturers will keep inside. Electronics integrate a wide variety of systems, provide the ability to differentiate and generate profit. Our panelists foresee increased first tier value added in electronics design, product engineering, manufacturing and assembly. Confirming this trend, the panelists rank the vehicle manufacturers losing value added across each of the electronics value added stages.

Other areas of identified first tier business opportunities include vehicle assembly and powertrain. Relatively strong indicators of increasing first tier value added in the manufacturing and assembly of vehicles relates to modular systems. These systems have been touted for years. However, there are few OEM contracts, so there is little interest in a concept with no profit potential. There are circulating rumors that at least one of the Big Three will launch a module-intensive vehicle before the end of the decade. Perhaps this survey is a leading indicator of future module opportunities.

Powertrain is a very interesting system to be identified for outsourcing potential. The powertrain is at the heart of a vehicle and is, along with the vehicle assembly body shop, one system that provides a vehicle its unique characteristic. Because there is not a corresponding reduction in the expected vehicle manufacturer value added, perhaps there are powertrain subsystems—but not the complete engine or transmission—that are candidates for outsourcing. Modular throttle body, fuel injection and intake manifolds are being designed, manufactured and delivered as a whole unit.

As we mentioned in the manufacturer/supplier comparison section, suppliers and manufacturers should use this type of outline to track contracts and monitor changes in the value-added chains.

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Definition of Terms
Market segment examples

Passenger Car	Domestic	Import
Lower small	Dodge Shadow Saturn	Toyota Tercel Mazda Protégé
Upper/Specialty small	Mercury Tracer Mercury Capri	Volkswagen Golf Isuzu Impulse
Lower middle	Dodge Spirit Pontiac Grand AM	Subaru Legacy Honda Accord
Upper/Specialty middle	Ford Taurus Pontiac Firebird	Nissan Maxima Toyota Celica
Large	Dodge Intrepid Chevrolet Caprice	No entries
Lower/Middle luxury	Lincoln Continental Buick Park Avenue	Acura Vigor Mazda 929
Upper luxury/Specialty	Cadillac Seville Lincoln Mark VIII	Jaguar XJ6 Lexus SC400

Light Truck	Domestic	Import
Small/Middle sport utility	Jeep Wrangler Ford Explorer	Suzuki Sidekick Nissan Pathfinder
Large/Luxury sport utility	Chevrolet Blazer GMC Yukon	Toyota Land Cruiser Range Rover
Small/Middle van	Dodge Caravan Ford Aerostar	Mazda MVP Volkswagen Eurovan
Large van	Dodge Ram Van Ford Econoline	No entries
Small pickup	Ford Ranger Chevrolet S-10	Isuzu Pickup Mitsubishi Pickup
Large pickup	Ford F-Series Dodge Ram Pickup	Toyota T-100

Source: *Ward's Automotive Reports*, November 2, 1992

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